

***AMT*Datasouth**

XL 300 SERIES

User's Guide



PART NO. 105853 Rev. G

INTRODUCTION

Your new printer is a general purpose impact printer for use in a variety of computer applications. Flexible communications and forms handling capabilities make this printer ideal for CRT slave printing, business systems output and remote computing terminal printing. It utilizes logic-seeking bidirectional printing at 300 cps to achieve high throughput. Under microprocessor control, the printhead automatically takes the shortest path to the next printable character.

The printer features include:

- **Twelve standard character sets and a library** which contains over 400 distinct characters.
- **Transfer feature** which allows the transfer of characters from the character library to any standard character set. This provides the user with the capability to include otherwise unavailable characters, such as the TM, ©, ® and symbols in a character set.
- Characters are printed in a **9-high by 7-wide dot matrix**.
- **True lower case descenders and simultaneous underlining** are possible because of the 9-wire printhead.
- **Forms up to nine parts in thickness** are accommodated by an adjustable head-to-platen gap.
- **Fanfold perforated forms from 3 to 15 inches** may be fed through the front or bottom of the printer.
- **Programmable features may be configured** from the control panel or via the communications line.
- **The LED indicators, digital display and custom keypad** make format set-up quick and simple.
- **A non-volatile memory** retains the settings when the printer is powered off to eliminate the need to reconfigure before each use.
- **Baud rates from 110 through 19,200** may be used over the RS-232 or optional current loop serial interface.
- **3K character buffer and a choice of two handshaking protocols** ensure optimum throughput.
- **An 8-bit parallel interface** is provided.

BBF-105853

The Supplier has made every effort to ensure that the contents of this document are complete and correct. Because of continuing product enhancements, we frequently update the manuals in this library. Your comments are welcome and any suggestions you have can help us improve the quality and usefulness of our publications. Comments may be addressed to place of purchase.

IBM and Proprinter XL are registered trademarks of International Business Machines.

Epson and FX-100 are registered trademarks of Seiko Epson Corporation.

DEC and LA-120 are registered trademarks of Digital Equipment Corporation.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

WARNING

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE

This equipment has been tested and found to comply with the limits for a Class A Digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

NOTE

When connecting the printer to a host computer system, always use shielded interface cables. The use of non-shielded interface cables is a violation of the FCC emissions limits for a Class A computing device. Do not leave unterminated interface cables connected to the printer.

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class A prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Umstellung oder Abänderungen diese Gerätes dürfen nur mit ausdrücklicher Einwilligung der für die Zulassung verantwortlichen Partei geschehen und Verstöße dagegen könnten zur Folge haben, daß die Betriebserlaubnis für diese Ausrüstung widerrufen wird.

Los cambios o modificaciones a esta unidad no aprobados explícitamente por la parte responsable del cumplimiento podrían invalidar la autoridad del usuario para hacer funcionar el equipo.

Les changements et modifications faits à cet unité et pas explicitement approuvés par la partie responsable de la conformité peuvent annuler l'autorité de l'usager à opérer l'équipement.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

Any alteration or modification to this equipment may cause non-compliance to:

Jegliche Umstellung oder Abänderung dieses Gerätes kann Zuwiderhandlung gegen:

Cualquier alteración o modificación a este equipo podría causar el incumplimiento con:

Le changement ou la modification quelconque à cet équipement peut causer non-conformité avec:

UL safety standard 1950

IEC safety standard 950

CSA safety standard C22.2 NO. 220

FCC Title 47, Part 15 regulations for Class A Computing Devices

VDE EMI regulation Vfg 1046, Class B

CISPR 22 Class A limits

Canadian Radio Interference Regulations

CRC c.1374, Class A, Canada

zur Folge haben.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

Connect 115V (230V) units to 115V (230V) outlets only!

115V (230V) Geräte nur an 115V (230V) Geräte anschließen!

¡Conectar unidades de 115V (230V) a tomas solamente de 115V (230V)!

Brancher les unités 115V (230V) avec seulement les prises 115V (230V)!

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

The printhead gets hot during use. Wait until the printhead is cool before handling the printhead.

Die Druckköpfe erhitzen sich, während das Gerät in Betrieb ist. Die Druckköpfe müssen erst ausgekühlt sein, bevor sie angefaßt werden dürfen.

La cabeza impresora se calienta con el uso. Esperar hasta que la cabeza impresora se enfríe antes de manipularla.

La tête d'impression se chauffe pendant l'usage. Attendre que la tête d'impression soit froide avant de la toucher.

CAUTION/VORSICHT/PRECAUCION/AVIS

If the power requirements are other than that indicated on the product label, the power selector switch must be set accordingly.

Wenn die Stromversorgung eine andere als in der Produktbeschreibung ist, muß der Stromeinstell-Schalter entsprechend eingestellt werden.

Si las necesidades de potencia son diferentes a aquellas indicadas en la placa del producto, el selector de potencia tiene que ser debidamente ajustado.

Si les nécessités de puissance sont autres que lesquelles indiquées sur l'étiquette du produit, il faut régler en conséquence la selectrice de puissance.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

Connecting this equipment to an ungrounded power receptacle can result in the risk of electrical shock.

Der Anschluß dieses Gerät an einen ungeerdeten Kraftstrom-Behälter kann einen elektrischen Schock verursachen.

El conectar este equipo a una toma de corriente no conectada a tierra puede resultar en el riesgo de un corrientazo.

Branchant cet équipement à une prise pas connecté à terre peut résulter en risque de choc électrique.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

Make certain the printer is disconnected from the AC power supply before reaching into the printer to perform any cleaning or maintenance task.

Der Drucker muß vom Stromnetz abgekuppelt sein, ehe irgend welche Wartungs- oder Reinigungsarbeiten vorgenommen werden können.

Asegurar que el impresor se desconecte de la corriente alterna AC antes de meter la mano dentro del impresor para cualquier labor de limpieza o mantenimiento.

Assurer que l'imprimante n'est pas brancher à la source de puissance AC avant de mettre la main dans l'imprimante pour nettoyage ou entretien.

CAUTION/VORSICHT/PRECAUCION/AVIS

The printer must have the correct line fuse installed for the selected input voltage.

Eine entsprechende Sicherung muß für die gewählte Voltzahl installiert werden.

El impresor tiene que tener instalado el fusible debido para el voltaje de entrada.

L'imprimante doit avoir installé la juste ligne de fusible pour le voltage d'entrée choisi.

WARNING/WARNUNG/ADVERTENCIA/ATTENTION

The operator must disconnect the printer from the AC power supply before performing any corrective action procedure that requires reaching into the printer.

Der Drucker muß von der Stromversorgung abgekuppelt werden, ehe irgend welche Berichtigungs-Maßnahmen durchgeführt werden, die es notwendig machen, in das Innere des Druckers zu langen.

El usuario tiene que desconectar el impresor de la corriente alterna AC antes de hacer cualquier procedimiento de corección que requiera meter la mano dentro del impresor.

Il faut que l'usager débranche l'imprimante de la source de puissance AC avant de réaliser quelconque procédure rectificatif que oblige mettre la main dans l'imprimante.

Einhaltung mit betreffenden Bestimmungen kommt darauf an, dass geschirmte Ausführungen gebraucht werden. Für die Beschaffung richtiger Ausführungen ist der Betreiber verantwortlich.

DIESES GERAET WURDE SOWOHL EINZELN ALS AUCH IN EINER ANLAGE, DIE EINEN NORMALEN ANWENDUNGSFALL NACHBILDET, AUF DIE EINHALTUNG DER FUNK-ENTSTOERBESTIMMUNGEN GEPRUEFT. ES IS JEDOCH MOEGLICH, DASS DIE FUNK-ENTSTOERBESTIMMUNGEN UNTER UNGUENSTIGEN UMSTAENDEN BEI ANDEREN GERAETEKOMBINATIONEN NICHT EINGEHALTEN WERDEN. DER BETREIBER IST FUER DIE EINHALTUNG DER FUNK-ENTSTOERUNGS BESTIMMUNGEN SEINER GESAMTEN ANLAGE VERANTWORTLICH, IN DER DIESES GERAET BETRIEBEN WIRD.

BESCHEINIGUNG DES HERSTELLERS/IMPORTEURS

Hiermit wird bescheinigt, dass der/die/das

Model XL300
(Gerat, Typ, Bezeichnung)

in Uebereinstimmung mit den Bestimmungen der

Vfg 1046/1984
(Amtsbkattverfugung)

funk-entstort ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerates angezeigt und die Berechtigung zur Ueberprufung der Serie auf Einhaltung der Bestimmungen eingeräumt.

Datasouth Computer Corporation
Name des Herstellers/Importeurs

Table of Contents

1	PRINTER INSTALLATION AND STARTUP	1-1
1.1	IN THIS CHAPTER	1-1
1.2	ABOUT THE PRINTER	1-1
1.3	HOW TO UNPACK AND SET UP A STANDARD OR DEMAND DOCUMENT PRINTER	1-4
1.4	HOW TO INSTALL AND POWER ON A STANDARD OR DEMAND DOCUMENT PRINTER	1-5
1.5	HOW TO INSTALL THE RIBBON CARTRIDGE ON A STANDARD PRINTER	1-7
1.6	HOW TO LOAD FORMS ON A STANDARD PRINTER	1-9
1.7	HOW TO INSTALL THE RIBBON CARTRIDGE ON A DEMAND DOCUMENT PRINTER	1-13
1.8	HOW TO LOAD FORMS ON A DEMAND DOCUMENT PRINTER	1-15
1.9	HOW TO ADJUST THE PRINthead ON A STANDARD OR DEMAND DOCUMENT PRINTER	1-18
1.10	HOW TO VERIFY PRINTER OPERATION	1-19
1.11	PRINTER INTERFACE TYPES	1-20
2	OPERATION	2-1
2.1	IN THIS CHAPTER	2-1
2.2	OPERATOR PANEL	2-1
2.3	USING THE OPERATOR PANEL	2-4
2.4	SETTING VALUE FEATURES	2-5
2.5	SETTING DISCRETE FEATURES	2-17
3	INTERFACING	3-1
3.1	INTRODUCTION	3-1
3.2	SERIAL INTERFACE	3-1
3.3	20 mA CURRENT LOOP INTERFACE	3-3
3.4	PARALLEL INTERFACE	3-4
4	PROGRAMMING	4-1
4.1	INTRODUCTION	4-1
4.2	CONTROL COMMANDS	4-1
4.3	ESCAPE SEQUENCES	4-2
4.4	CHARACTER SETS	4-13
4.5	GRAPHICS	4-15
4.6	BAR CODE PRINTING (OPTIONAL)	4-28
5	OPERATOR MAINTENANCE AND TROUBLESHOOTING	5-1
5.1	INTRODUCTION	5-1
5.2	MAINTENANCE	5-1
5.3	TROUBLESHOOTING	5-2
5.4	WHEN THE PROBLEM IS NOT RELATED TO FEATURES	5-4
	APPENDIX A SPECIFICATIONS	A-1
	APPENDIX B DATASOUTH CHARACTER LIBRARY	B-1
	APPENDIX C ASCII CHARACTER SETS	C-1
	APPENDIX D DISPLAY MODE CHARACTERS	D-1

APPENDIX E CONTROL COMMANDS	E-1
APPENDIX F VALUE & DISCRETE FEATURES	F-1

List of Illustrations

Figure 1.1 Printer	1-2
Figure 1.2 Power and Interface Connections	1-5
Figure 1.3 Installing the Ribbon Cartridge	1-8
Figure 1.4 Form Loading Slots on a Standard Printer	1-9
Figure 1.5 Left Tractor Placement on a Standard Printer	1-10
Figure 1.6 Tear Bar Removal on a Demand Document Printer	1-13
Figure 1.7 Ribbon Cartridge Installation on a Demand Document Printer	1-14
Figure 1.8 Paper Path on a Demand Document Printer	1-15
Figure 1.9 Raising the Printer on the Optional Tilt Stand	1-15
Figure 1.10 Setting Top-of-Form on a Demand Document Printer	1-17
Figure 1.11 Initiating Print Test	1-19
Figure 1.12 Test Pattern	1-20
Figure 2.1 Operator Panel	2-1
Figure 2.2 Buffer Control	2-16
Figure 2.3. Handshake on Acknowledge, Acknowledge Before Busy	2-24
Figure 2.4. Handshake on Busy, Acknowledge Before Busy	2-24
Figure 2.5 Acknowledge After Busy	2-25
Figure 3.1 Serial Interface (Controller Board)	3-3
Figure 3.2 Receiver and Driver Configuration	3-5
Figure 3.3 Parallel Data Timing (upwards Centronics Compatible)	3-5
Figure 4.1 Print Wires	4-15
Figure 4.2 Graphics Figure	4-16
Figure 4.3 Diamond Pattern	4-19
Figure 4.4 Print Wires (Epson Graphics)	4-21
Figure 4.5 Graphics Figure (Epson Graphics)	4-22
Figure 4.6 Diamond Pattern (Epson Graphics)	4-26
Figure 4.7 Bar Code Samples	4-30
Figure 4.8 Bar Code Height Sample	4-31
Figure 4.9 Bar Code Sample	4-32

List of Tables

Table 2.1 Operator Panel	2-2
Table 2.2 Valid Nationalities	2-10
Table 3.1 Serial Interface Connector Pin Assignment	3-2
Table 3.2 Parallel Interface Connector Pin Assignment	3-6
Table 4.1 Control Commands	4-1
Table 4.2 Shift-out/Shift-in Functions	4-2
Table 4.3 Common Mode Escape Sequences	4-3
Table 4.4 DS-180 Mode Escape Sequences	4-3

Table 4.5	Epson Mode Escape Sequences	4-6
Table 4.6	LA-120 Escape Sequences	4-10
Table 4.7	Special > Codes	4-33

1 PRINTER INSTALLATION AND STARTUP

1.1 IN THIS CHAPTER

This chapter explains how to unpack, install, and start the printer. It includes step-by-step instructions for all procedures from unpacking through complete installation. This chapter also includes illustrations to familiarize you with the printer parts and to help you perform the procedures.

Some procedures in this chapter vary slightly depending on whether you have a standard printer or a demand document printer. Therefore, refer to the following lists which explain which Paragraphs you should read:

If you have a **standard printer**, then read

- Paragraphs 1.2 through 1.6.2 and
- Paragraphs 1.10 through 1.12

If you have a **demand document printer**, then read

- Paragraphs 1.2 through 1.4 and
- Paragraphs 1.7 through 1.12

1.2 ABOUT THE PRINTER

The printer occupies a surface area 24.5" x 16". Provide at least 2 inches of clearance on all sides of the printer for adequate ventilation.

With a **standard printer**, forms can be either front-loaded or bottom-loaded. With a **demand document printer**, forms are bottom-loaded only. For front-loading standard printers, you should locate the printer near the front edge of the table so that forms will have a clear path into the front feed slot. For bottom-loading printers, place the printer on a stand or a slotted work table.

Both standard and demand document printers accommodate forms ranging in width from 3 through 15 inches. Forms must be the pin feed type. The printers also accommodate multiple-part forms with as many as nine sheets and with a maximum recommended thickness of 0.021 inch.

Figure 1.1 represents a typical standard or demand document printer. As you study this illustration, compare all parts identified in the illustration to the printer itself. Being familiar with the printer parts will help you install and operate the printer.

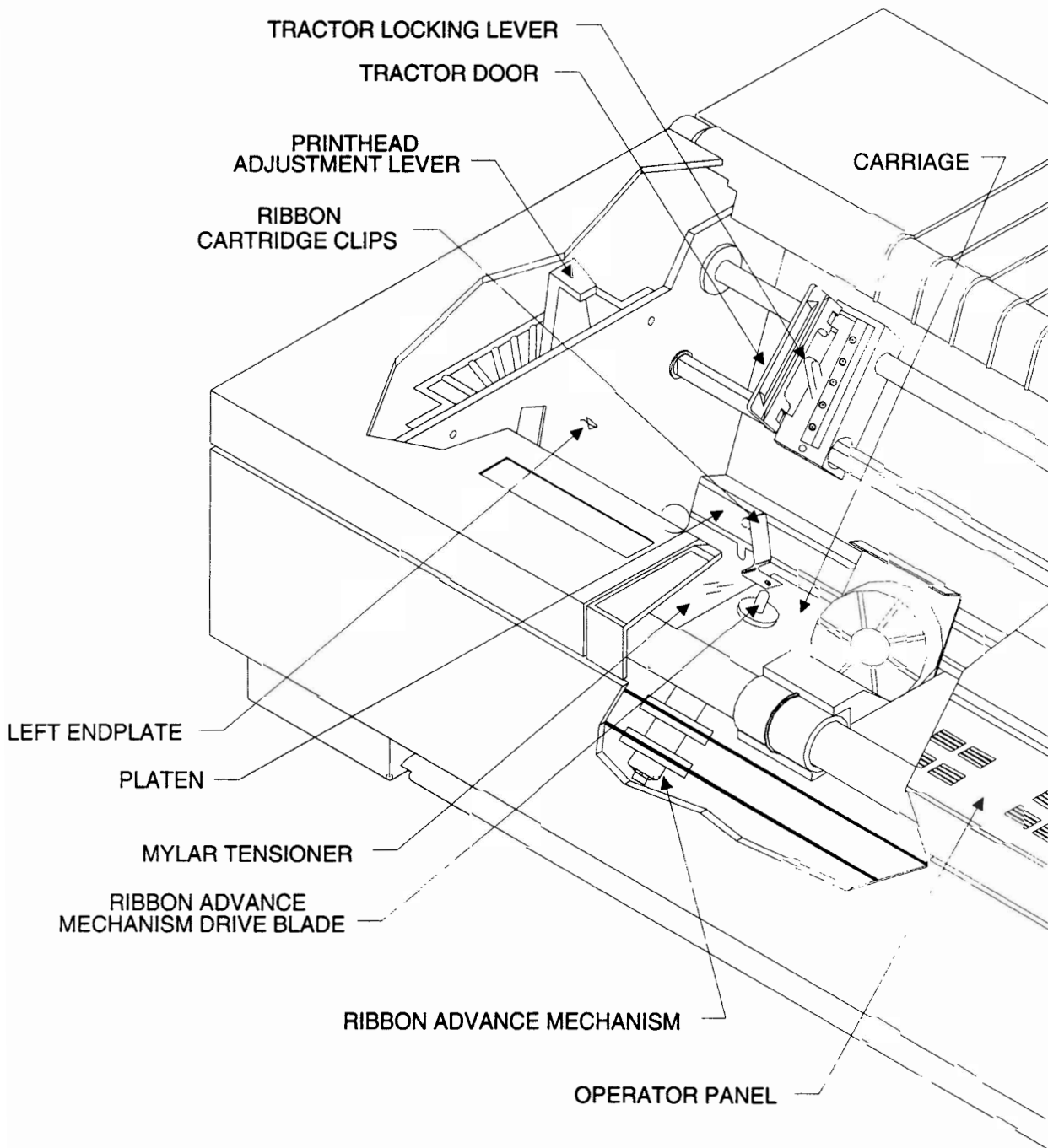
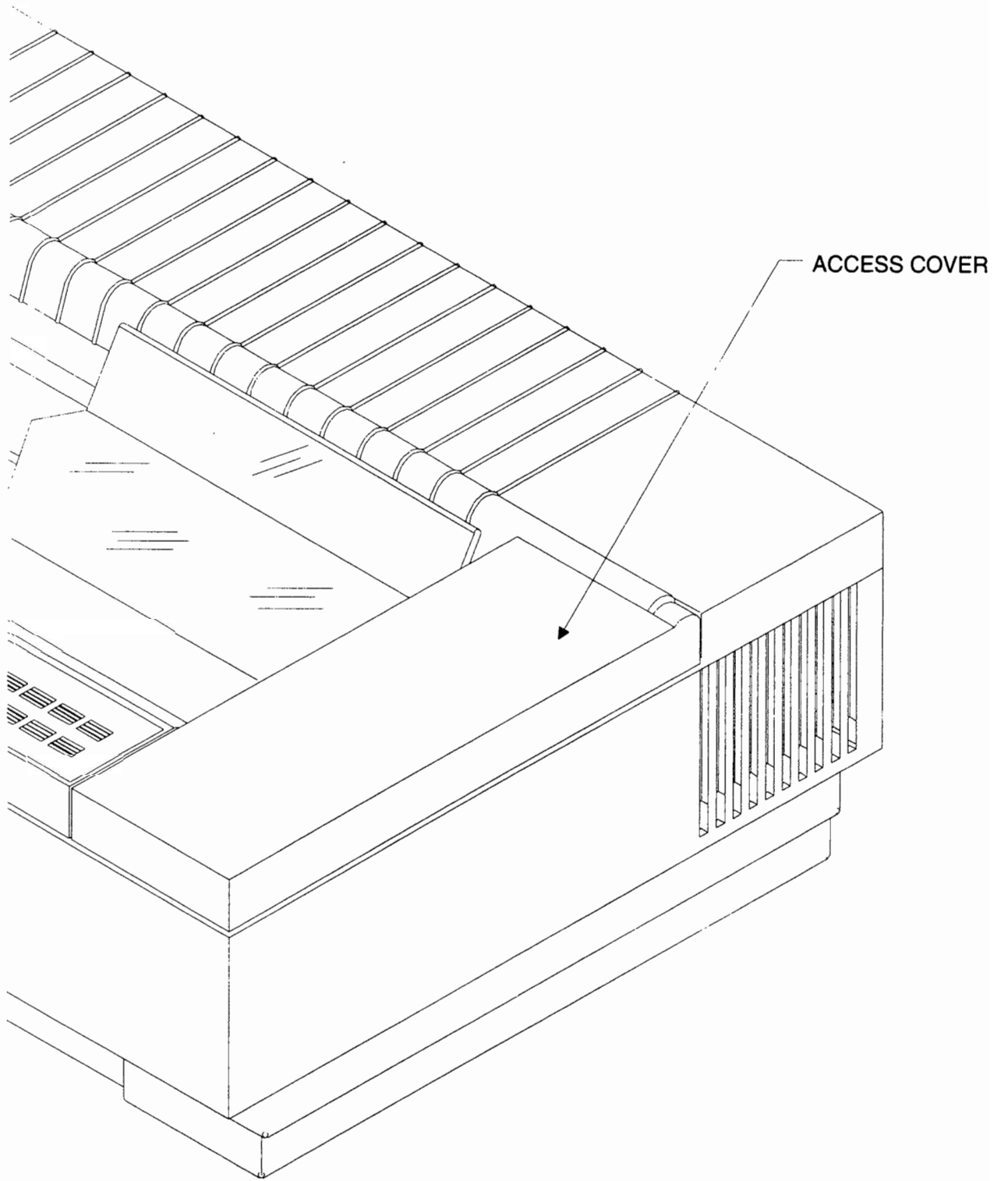


Figure 1.1 Printer



1.3 HOW TO UNPACK AND SET UP A STANDARD OR DEMAND DOCUMENT PRINTER

Perform the following steps:

1. Lift the printer from the box and place the printer on the stand or work table where it will operate.
2. Remove the following items from the box and identify each item:
 - Printer
 - Power cord
 - User documentation

NOTE:

Do not discard original packaging materials. Shipping the printer in any container other than its original packaging may cause damage during shipping and may void the warranty.

3. Lift the access cover and remove the shipping restraint from the carriage and right endplate. (To locate the carriage, see Figure 1.1.)
4. Manually move the carriage.
Result: A noticeable degree of resistance occurs due to the stepper motor, but the carriage should move smoothly without binding.

NOTE:

If the carriage either does not move smoothly (because it is jammed or due to momentary binding), or moves with no resistance at all, then have the cable drive mechanism inspected by a service technician before operating the printer.

1.4 HOW TO INSTALL AND POWER ON A STANDARD OR DEMAND DOCUMENT PRINTER

The power cord input connector and power switch are located on the left rear of the printer, as shown in Figure 1.2.

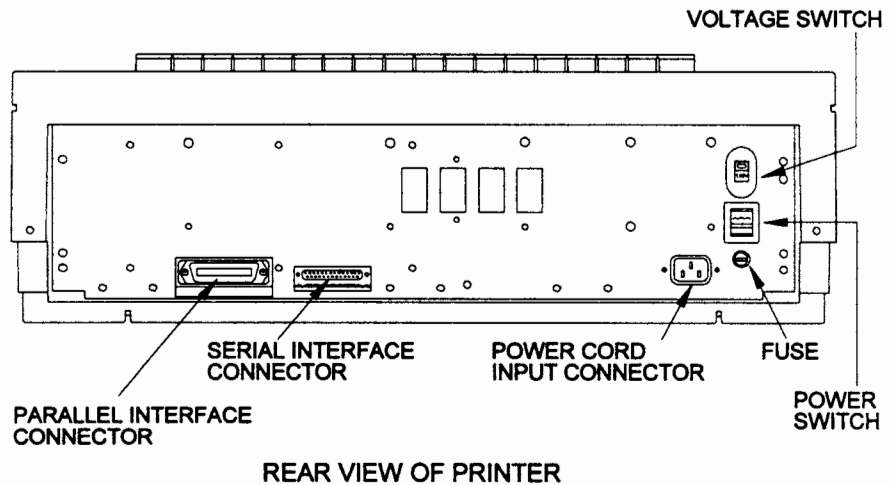


Figure 1.2 Power and Interface Connections

To install the power cord and send power to the printer, perform the following steps:

1. Set the power switch to OFF.
2. Observe the input voltage setting label on the rear of the printer. Make sure that this voltage is correct for the installation. If not, proceed as follows:
 - Set the voltage select switch to the proper input voltage.
 - Install the proper fuse as directed by the voltage setting label.
3. Remove the label and install the end of the power cord into the power cord input connector. Make sure the power cord is properly seated.
4. Plug the other end of the power cord into a grounded AC outlet (115 volts for United States users).

NOTE

Plugging the printer into an outlet which is not grounded will result in increased radio frequency noise generation (see the FCC Testing note in the front of this manual) and may also cause erratic printer operation.

5. Set the power switch to ON.
Result: When the printer is turned on, the carriage automatically resets to the left margin. Also, the Paper out indicator on the operator panel flashes continuously and an audio alarm sounds three short tones. This simply indicates there is no paper in the printer.
6. Perform a default reset (as explained in Chapter 5, Paragraph 5.3).
Result: A default reset loads a known set of parameters (default values) into the non-volatile memory.

1.5 HOW TO INSTALL THE RIBBON CARTRIDGE ON A STANDARD PRINTER

The standard printer uses a Tritel type inking cartridge. Cartridges of this type are easily obtained from a dealer or distributor. For more information on obtaining cartridges, contact place of purchase.

Some ribbon cartridges have a smudge guard — a strip of plastic installed across the exposed part of the ribbon. This smudge guard helps prevent the ribbon from smudging the paper if the ribbon comes in contact with the paper. Do not remove the smudge guard.

To install the ribbon cartridge, perform the following steps:

1. Set the power switch to OFF or take the printer off line.
2. Raise the access cover.
3. Manually move the carriage to the center of the printer.

WARNING

The printhead gets hot during use. Wait until the printhead is cool before handling it.

4. Using the printhead adjustment lever, move the printhead as far from the platen as possible.
5. Before placing the ribbon cartridge in the printer, remove any slack in the ribbon by turning the knob on the upper side of the ribbon cartridge counterclockwise.

6. Place the ribbon cartridge over the printhead (rear of cartridge first) with the exposed ribbon sliding down between the platen and the printhead nose (see Figure 1.3).

When installing the ribbon cartridge, make certain the smudge guard does not hang up on the platen or the printhead nose, and that the smudge guard is positioned so that it will bend away from the form (also shown in Figure 1.3).

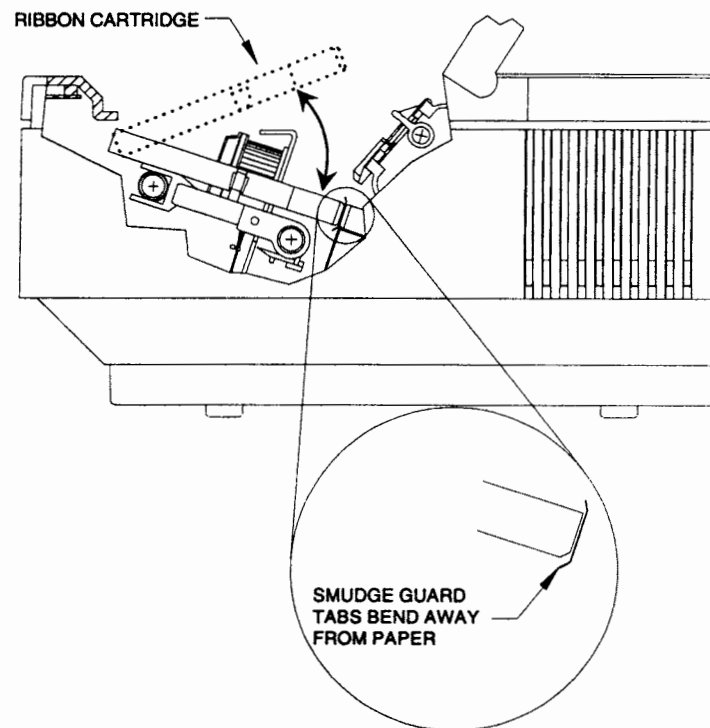


Figure 1.3

7. Align the guide pin holes in the ribbon cartridge over the guide pins and press down evenly on the cartridge. Make sure that the cartridge clips engage the carriage firmly.
8. Manually move the carriage from left to right several times while watching the knob on the ribbon cartridge.
Result: The knob should always rotate counterclockwise indicating the ribbon is advancing from right to left.
9. Lower the access cover.
10. Set the power switch to ON, or press the Continue key if off line.

1.6 HOW TO LOAD FORMS ON A STANDARD PRINTER

The standard printer accommodates pin feed forms ranging in width from 3 to 15 inches. You can use multiple part forms with as many as nine sheets, and with a maximum recommended thickness of 0.021 inch.

If you use a form with card stock, the card must be the last part and entry into the printer must be through the bottom feed slot.

LOADING METHODS:

As shown in Figure 1.4, you can load forms into the printer either through

- the front of the printer when the printer is mounted on a desktop (front loading) or
- the bottom of the printer when the printer is mounted on a stand (bottom loading).

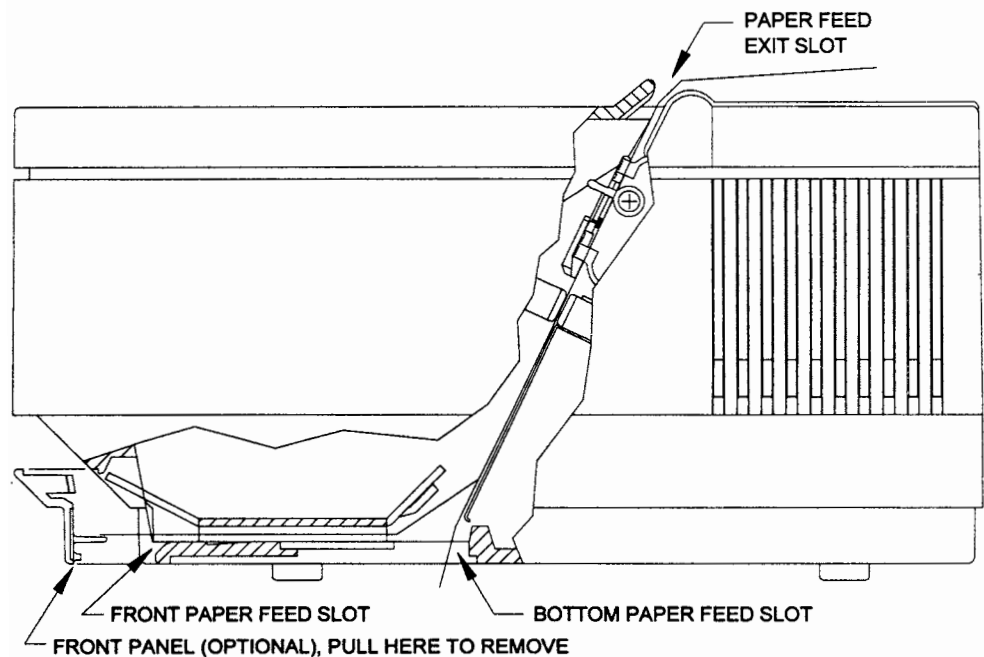


Figure 1.4 Form Loading Slots on a Standard Printer

1.6.1 PROCEDURE FOR FRONT-LOADING THE FORMS

To front-load a form on a standard printer, perform the following steps:

1. Make certain the printer is in the Off Line condition (the On Line light is off).
2. If your printer is equipped with a front panel, as shown in Figure 1.4, you must first remove it by pulling forward on the bottom edge.
3. Raise the access cover.
4. Move the printhead away from the platen by moving the printhead adjustment lever toward the front of the printer to the last position.
5. To set the left margin of the paper, *manually* move the printhead to the far left of the printer and align the left tractor with the printhead. (See Figure 1.5.) Use the tractor locking lever to lock the tractor in this position.

WARNING
The printhead gets hot during use. Wait until the printhead is cool before handling it.

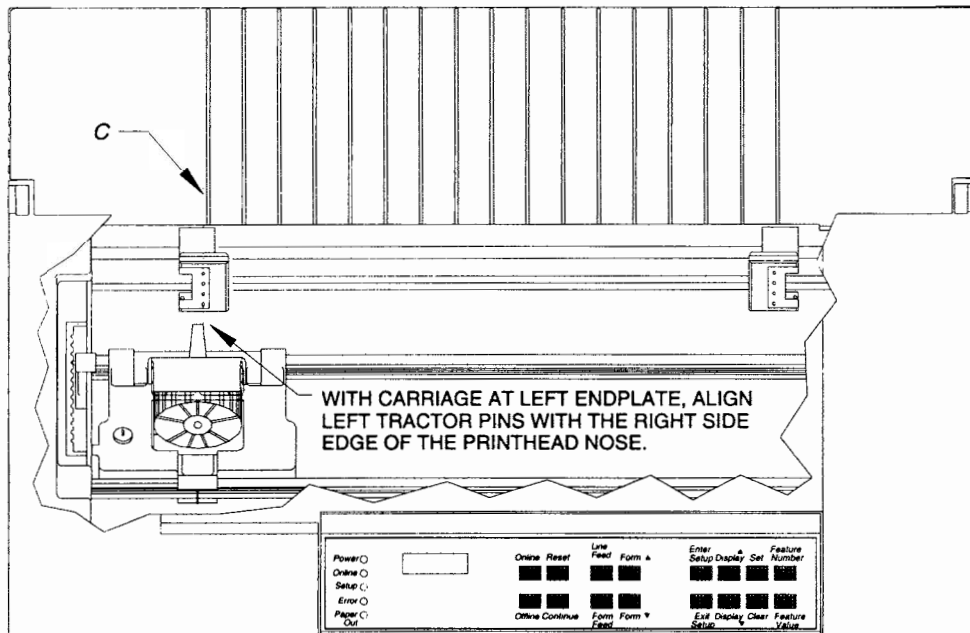


Figure 1.5 Left Tractor Placement on a Standard Printer

6. Manually move the printhead to the center of the printer.

7. Push the paper into the front feed slot and continue to feed paper in until it advances past the mylar tensioner.
8. Pull the top of the paper up until it is level with the top of the tractors.
9. Place the left side of the paper in the left tractor.
10. Align the right tractor with the right side of the paper and lock it into position. Place the paper into the tractor.
11. Set the top of form as follows:

Advance the form into the required position by using the Line Feed, Form ▲, and Form ▼ keys.

Press the Set key so that the digital readout displays 1, indicating line 1.

Press the Form Feed key.
Result: The paper advances by one sheet and stops at the preset top-of-form position.
12. Adjust the printhead for forms thickness (described in Paragraph 1.9).
13. As a final check, make certain the paper is properly aligned and is resting flat against the platen with no wrinkling or buckling. The paper path to the printer must be unrestricted (paper should not travel across desk corners or other objects).

NOTE:
To determine if the form is correctly positioned, you can run the self-test procedure which prints test data. This procedure is described in Paragraph 1.10.1.

1.6.2 PROCEDURE FOR BOTTOM-LOADING THE FORMS

The procedure for loading paper through the bottom of the printer is similar to the previous procedure. To bottom-load the forms, perform the following steps:

1. Make certain the printer is in the Off Line condition (the On Line light is off).
2. Raise the access cover.
3. Move the printhead away from the platen by moving the printhead adjustment lever toward the front of the printer to the last position.
4. To help set the left margin of the paper, manually move the printhead to the far left of the printer and align the left tractor with the printhead (see Figure 1.5). Use the tractor locking lever to lock the tractor in this position.

WARNING
The printhead gets hot during use. Wait until the printhead is cool before handling it.

5. Manually move the printhead to the center of the printer.
6. Insert the paper through the bottom feed slot and continue to feed paper in until it advances past the mylar tensioner. Make certain the paper path is unrestricted.
7. Pull the top of the paper up until it is level with the top of the tractors.
8. Place the left side of the paper in the left tractor.
9. Align the right tractor with the right side of the paper and lock it into position. Place the paper into the tractor.
10. Set the top of form as follows:

Advance the form into the required position by using the Line Feed, Form ▲, and Form ▼ keys.

Press the Set key so that the digital readout displays 1, indicating line 1.

Press the Form Feed key.

Result: The paper advances by one sheet and stops at the preset top-of-form position.
11. Adjust the printhead for forms thickness (described in Paragraph 1.9).
12. As a final check, make certain the paper is properly aligned and is resting flat against the platen with no wrinkling or buckling. The paper path to the printer must be unrestricted (paper should not travel across desk corners or other objects).

NOTE:

To determine if the form is correctly positioned,
you can run the self-test procedure which prints test data.
This procedure is described in Paragraph 1.10.

1.7 HOW TO INSTALL THE RIBBON CARTRIDGE ON A DEMAND DOCUMENT PRINTER

The demand document printer uses a Tritel type inking cartridge. Cartridges of this type are easily obtained from a dealer or distributor. For more information on obtaining cartridges, contact place of purchase.

Some ribbon cartridges have a smudge guard — a strip of plastic installed across the exposed part of the ribbon. This smudge guard helps prevent the ribbon from smudging the paper if the ribbon comes in contact with the paper. Do not remove the smudge guard.

To install the ribbon cartridge, perform the following steps:

1. Set the power switch to OFF, or take the printer off line.
2. Raise the access cover.
3. Manually move the carriage to the center of the printer.

WARNING
The printhead gets hot during use. Wait until the printhead is cool before handling it.

4. Move the printhead away from the platen by moving the printhead adjustment lever toward the front of the printer to the last position.
5. Loosen the two thumb screws securing the tear bar to the platen. (See Figure 1.6). Do not remove the thumb screws.

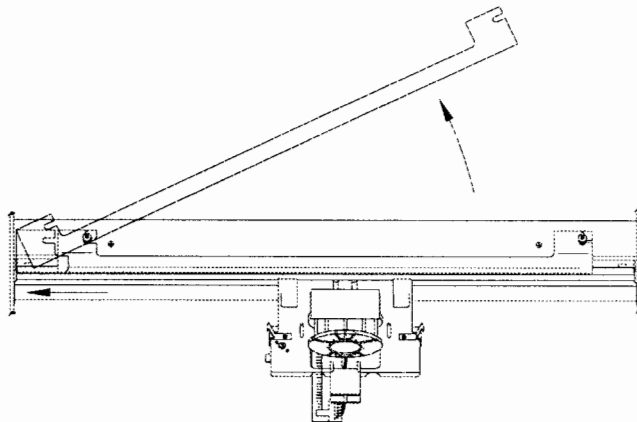


Figure 1.6 Tear Bar Removal on a Demand Document Printer

6. Slide the tear bar to the left so the screws no longer engage the slot in the tear bar.
7. Lift the tear bar out of the printer (right end first).
8. To remove any slack in the ribbon, turn the knob on the upper side of the ribbon cartridge counterclockwise.

9. Place the ribbon cartridge over the printhead (rear of cartridge first) with the exposed ribbon sliding down between the platen and the printhead nose (See Figure 1.7).

When installing the ribbon cartridge, make certain the smudge guard does not hang up on the platen or the printhead nose, and that the smudge guard is positioned so that it will bend away from the form (also shown in Figure 1.7).

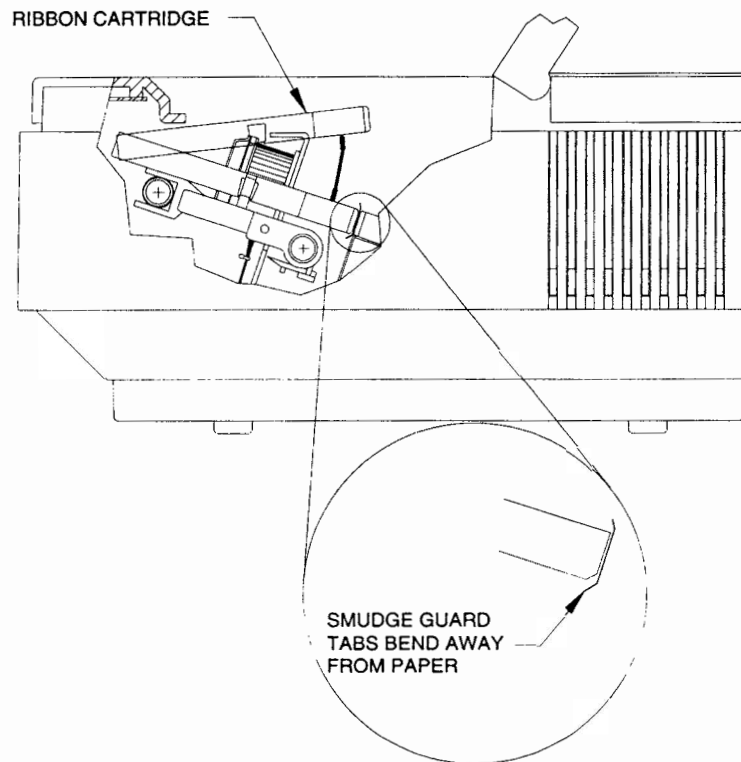


Figure 1.7 Ribbon Cartridge Installation on a Demand Document Printer

10. Align the guide pin holes in the ribbon cartridge over the guide pins on the carriage and press down evenly on the cartridge. Make sure that the cartridge clips engage the carriage firmly.
11. Manually move the carriage from left to right several times while watching the knob on the ribbon cartridge.
Result: The knob should always rotate counterclockwise, indicating the ribbon is advancing right-to-left.
12. Replace the tear bar and access cover.

1.8 HOW TO LOAD FORMS ON A DEMAND DOCUMENT PRINTER

The demand document printer accommodates forms ranging in width from 3 to 15 inches. You can use multiple part forms of as many as nine sheets, with a maximum recommended thickness of 0.021 inch. Forms must be of the pin feed type.

Figure 1.8 illustrates the paper path through the demand document printer.

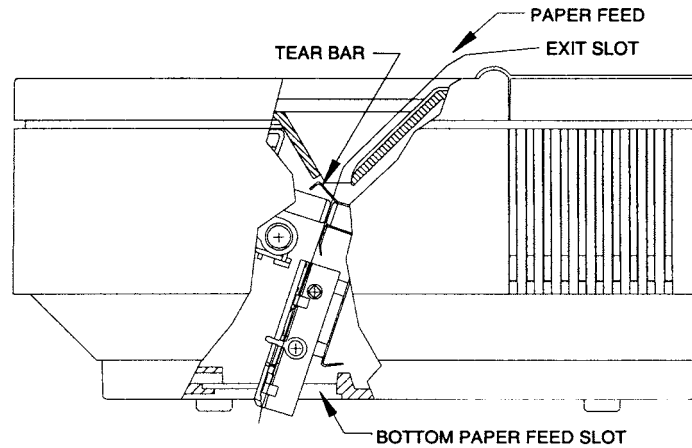


Figure 1.8 Paper Path on a Demand Document Printer

To load forms into the demand document printer, perform the following steps:

1. Make certain the printer is in the Off Line condition (the On Line light is off).
2. If the printer is attached to the optional tilt stand, lift the printer up as shown in Figure 1.9.

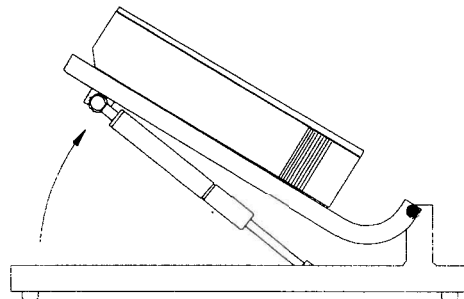


Figure 1.9 Raising the Printer on the Optional Tilt Stand

3. Raise the access cover and manually move the printhead to the right endplate.

WARNING
**The printhead gets hot during use. Wait until the
printhead is cool before handling it.**

4. Move the printhead away from the platen by moving the printhead adjustment lever toward the front of the printer to the last position.
5. Release the locking lever on the left tractor and position the tractor so it is approximately 1/4 inch from the printhead ribbon cable. Lock the tractor in this position.
6. Insert the form through the bottom feed slot.
7. Place the left side of the form into the left tractor and close the tractor door.
8. Align the right tractor with the right side of the form and lock the tractor in this position. Place the form into the tractor and close the tractor door. If the printer is on the optional tilt stand, return the stand to the normal position.
9. Load the form to the tear bar or print position.
10. To facilitate form removal and to prevent the form from tearing either above or below the perforation when it is removed, set the top of form so the perforation is even with the tear bar. See Figure 1.10.

This will also position the top of form so the first line of print is on the second line of the form, if no additional line feeds are sent at the beginning of the print job.

11. Set the top of form as follows:

Advance the form up to the tear bar using the Line Feed key.

Align the form perforation with the tear bar by pressing the Form ▲ key or the Form ▼ key.

Press the Set key so that the digital readout displays 1, indicating line 1.

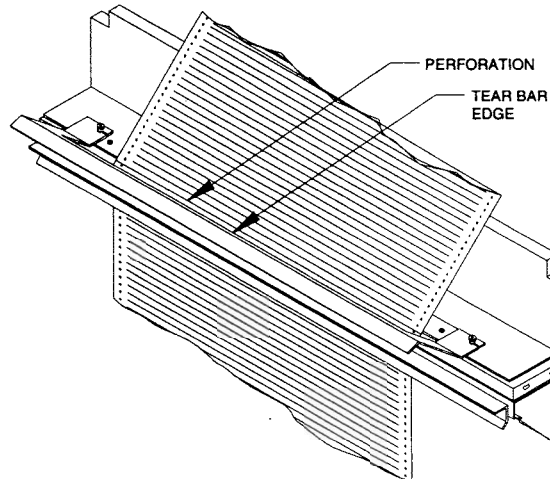


Figure 1.10 Setting Top-of-Form on a Demand Document Printer

12. Readjust the printhead for forms thickness as described in Paragraph 1.9.
13. To determine if the form is correctly positioned, you can run the print-test procedure which prints test data. This procedure is described in Paragraph 1.10.
14. If necessary, make vertical adjustments using the Line Feed key for large adjustments, and the Form ▲ and the Form ▼ keys for precise alignment. Make horizontal adjustments using Features 5 and 6 (in Chapter 2) to set the left and right margins, or physically reposition the form by adjusting the left and right tractor position.
15. As a final check, make certain the paper is resting flat against the platen with no wrinkling or buckling. The paper path to the printer must be unrestricted. (Paper should not travel across the edge of the paper box, or across desk corners or other objects.)

1.9 HOW TO ADJUST THE PRINTHEAD ON A STANDARD OR DEMAND DOCUMENT PRINTER

To achieve the optimum print quality for the current form thickness, adjust the printhead-to-platen gap with the printhead adjustment lever. To begin the set-up the lever should be in the position the farthest away from the platen.

After installing the ribbon cartridge and loading the forms, adjust the printhead-to-platen gap as follows:

1. Set the power switch to the OFF position.
2. Lift the access cover and locate the printhead adjustment lever (see Figure 1.1).
3. Begin with the lever in the position farthest from the platen and run a print sample) as explained in Paragraph 1.11). If the print quality is not acceptable (that is, dots are missing from characters), move the printhead closer by one position. Run another print sample.
Result: As the printhead moves closer, the impact force of the print wires increases, thus causing the print quality to improve. However, this also increases the likelihood of ribbon smearing.
3. Continue to move the printhead closer and run print samples until an acceptable print quality is produced.

CAUTION

Do not adjust the printhead closer after acceptable print quality has been obtained. Print quality will not improve further, and excessive printhead wear will result.

NOTE

There is no direct correlation between printhead position and paper type (that is, the printhead adjustment lever is not set to the fourth position for a four-part form).

6. To stop the printer, press the Clear key. Figure 1.12 is a sample of the first ten lines of the printout. After the printer stops, check the printout for errors by comparing it to Figure 1.12.

```

! *%#%&'()*+,-./0123456789!; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZC
! *%#%&'()*+,-./0123456789!; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZC\
! *%#%&'()*+,-./0123456789!; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZC\]
! *%#%&'()*+,-./0123456789!; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZC\]^
! *%#%&'()*+,-./0123456789!; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZC\]^_
! *%#%&'()*+,-./0123456789!; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZC\]^_`
! *%#%&'()*+,-./0123456789!; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZC\]^_`a
! *%#%&'()*+,-./0123456789!; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZC\]^_`ab
! *%#%&'()*+,-./0123456789!; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZC\]^_`abc
! *%#%&'()*+,-./0123456789!; <=>?@ABCDEFGHIJKLMN O PQRSTU VWXYZC\]^_`abcd

```

Figure 1.12 Test Pattern

7. To restore the printer to normal after print-test, press the Exit Setup key.
8. Press the Online key to continue operation.

1.11 PRINTER INTERFACE TYPES

Because the printer acts as an output device for another device such as a computer, it must have a communications interface to enable data to be transmitted between the two devices.

This printer has three types of communications interfaces:

- Serial interface (EIA RS-232-C)
- Centronics parallel interface (TTL level 8-bit)
- Current loop interface (optional)

These types of interfaces are industry standards which allow compatibility with a large number of other products. For more detailed information about interfacing, see Chapter 3.

2 OPERATION

2.1 IN THIS CHAPTER

This chapter contains sections which describe how the operator may set the various programmable features in order to gain the most efficient use of the printer.

2.2 OPERATOR PANEL

From the control panel, the operator can change communications, printing and forms-handling features to fit a variety of applications. A functional description of the operator panel controls and indicators is given in Table 2.1.

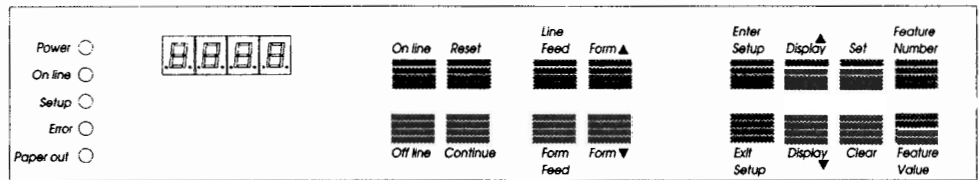


Figure 2.1 Operator Panel

Table 2.1 Operator Panel	
Key or Indicator	Function
Power Indicator	LED (Light Emitting Diode) glows steadily when power is on.
On line Indicator	LED glows steadily when the printer is on line.
Setup Indicator	Flashes while printer is in setup mode.
Error Indicator	LED blinks when an error condition occurs.
Paper out Indicator	LED blinks when paper-out condition occurs.
Digital Display	Displays feature numbers, values of features being programmed and error codes.
On line Key	Press this key to place the printer on line.
Off line Key	Press this key to place the printer in the local or off line condition.
Reset Key	Press this key to restore the carriage to the left margin, reset the printhead positioning logic and clear the print buffer.
Continue Key	Press this key to resume operation after an error or paper-out condition has been corrected, and restore the carriage to the left margin. This key does not clear the print buffer.
Line Feed Key	Press this key to generate a line feed. This key operates in either the off line or on line condition. If the switch is depressed for more than .5 seconds, the paper will advance continuously until the key is released. This paper movement is registered electronically in the forms control program.
Form Feed Key	Press this key to generate a paper movement to the preset top of the next form. This key operates in either the off line or on line condition. This paper movement is registered electronically in the forms control program.
Form ▲ Key	Press this key to move the form upward 1/48 inch for precise form alignment. This key operates in either the off line or on line condition. This paper movement does not register electronically in the forms control program. This key may be used while the printer is operating.

Table 2.1 Operator Panel	
Key or Indicator	Function
Form ▼ Key	Press this key to move the form downward 1/48 inch for precise form alignment. This key operates in either the off line or on line condition. This paper movement does not register electronically in the forms control program. This key may be used while the printer is operating.
Enter Setup Key	Press this key to enter setup mode. Printer must be off line to use this function.
Exit Setup Key	Press this key to exit setup mode.
Display ▲ Key	Press this key to increase digital display value when in Setup mode.
Display ▼ Key	Press this key to decrease digital display value when in Setup mode.
Set Key	When in Setup mode, press this key to set the numeric value of the feature in the display (value features). It is also used to set the "ON" or "ENABLED" condition on features 27 through 99 (discrete features). When the printer is not in setup mode, the Set key is used to set the top of form (see Procedure 1.7.2 or 1.7.3 for Standard printer and Procedure 1.9.1 for Demand Document printer).
Clear Key	Press this key to set an "OFF" or "DISABLED" condition for discrete features.
Feature Value Key	Press this key to display the value of the feature currently addressed.
Feature Key	Press this key, then press the Display ▲ or Display ▼ key to allow the operator to select the desired feature.

2.3 USING THE OPERATOR PANEL

The operator panel allows convenient configuration of all programmable features of the printer. By specifying these features (such as left and right margins, etc.) the printer can be adapted to best suit the print job. Once set, the values are retained in a non-volatile memory and will not be lost when power is turned off. When powered on, the printer resumes operation with all user-programmable features configured as they were when the printer was last powered off.

The programmable features are divided into two main categories; value features and discrete features. Value features are those features which require a numeric value. Discrete features are those features which require only an on/off setting. Descriptions of all features and examples of how to set both types are given in the following paragraphs.

2.4 SETTING VALUE FEATURES

The following example shows how to use the operator panel to program the right margin.

1. Press the Off line key to take the printer off line.
2. Press the Enter Setup key to enter the setup mode.
3. Press the Display ▲ until 6 (the feature we wish to change) shows in the display.
4. Press Feature Value to display the current right margin setting.
5. Use the Display ▲ or Display ▼ keys to select the value required for your application. For example Display ▼ from the default value of 132 to 85 for 8.5 inch paper if you are using a 10 CPI font.
6. Press Set to save the value you have selected.
7. If you wish to change another feature, press the Feature key and follow steps 3 through 7 for each value feature to be changed.
8. Press the Exit Setup key to exit Setup mode.
9. Press On Line to resume normal operation.

The above example depicts the appropriate procedure for programming features 1 through 26. A description of all value features and instruction on how to program each are given below.

NOTE

For future reference, record the setting of each value feature in Appendix F, or print a feature listing via Feature 98.

NOTE

To view or change any feature, the printer must be off line and in Setup mode.

2.4.1 Feature 1 - BAUD RATES

Baud rates from 110-19,200 may be selected. The baud rate must be programmed from the control panel. Baud rates cannot be programmed via the communications line.

2.4.2 Feature 2 - FORM LENGTH

The form length may be programmed for lengths of 1 through 217 lines.

NOTE

Before setting the form length, verify that the vertical pitch (Features 11 or 39) are set to the appropriate value.

Procedure:

1. To set the form length to 66 lines, enter setup mode and advance the display to 2 (the feature number for the form length feature).
2. Press the Feature Value key and then advance the display to 66 (the desired value for form length).
3. Press the Set key to enter the value in the non-volatile memory.
4. Press the Exit Setup key to exit setup mode.

NOTE

Changing form length clears the top and bottom margins and sets the top of form at the current line. Form length of 66 lines is the default value for this feature.

2.4.3 Feature 3 and Feature 4 - TOP AND BOTTOM FORM MARGINS, (PERFORATION SKIPOVER)

The feature number for the top margin is 3. The feature number for the bottom margin (last line of print) is 4. When the printer reaches the bottom margin of a page and receives a vertical paper movement command such as Line Feed, Form Feed, or Vertical Tab, the paper will automatically slew to the top margin of the next page or top of form if Feature 94 is set to 1.

Procedure:

1. To set the top margin at line 5 and the bottom margin at line 60, enter setup mode and advance the display to 3 (the feature number for the top margin).
2. Press the Feature Value key and then advance the display to 5 (the desired value for the top margin).
3. Press the Set key to enter the value in the non-volatile memory.
4. Press the Feature key to return to feature mode.
5. Advance the display to 4 (the feature number for the bottom margin).
6. Press the Feature Value key and advance the display to 60 (the desired value for the bottom margin).
7. Press the Set key to enter the value in the non-volatile memory.
8. Press the Exit Setup key to exit setup mode.

NOTE

The bottom margin must be set to a value less than or equal to the top margin. If an illegal command is entered, the "BELL" will sound indicating that the command has not been accepted.

2.4.4 Feature 5 and Feature 6 - LEFT AND RIGHT MARGINS

The left margin (first printable column) may be set in any column within the range specified for each pitch in Appendix A. However, the left margin must be set less than or equal to the right margin. The feature number for the left margin is 5.

The right margin (last printable column) may be set in any column within the range specified for each pitch in Appendix A. However, the right margin must be set greater than or equal to the left margin. The feature number for the right margin is 6.

NOTE

Margins are maintained independently for each horizontal pitch.

Procedure:

1. To set the left margin at column 10, and the right margin at column 80, enter setup mode and advance the display to 5 (the feature number for the left margin).
2. Press the Feature Value key and then advance the display to 10 (the desired value for the left margin).
3. Press the Set key to enter the value in the non-volatile memory.
4. Press the Feature key to return to feature mode.
5. Advance the display to 6 (the feature number for the right margin).
6. Press the Feature Value key and advance the display to 80 (the desired value for the right margin).
7. Press the Set key to enter the value in the non-volatile memory.
8. Press the Exit Setup key to exit setup mode.

CAUTION

*Margins should be set first
to avoid printing off the edge of the form,
which can damage the printhead and may void the warranty.*

NOTE

The left margin must have a value less than or equal to the right margin. If an illegal value is entered, the “BELL” will sound indicating that the value has not been accepted.

2.4.5 Feature 7 - HORIZONTAL TABS

When a horizontal tab is received from the communications line, the printhead advances to the next column at which a horizontal tab stop has been set.

To set, clear, or view the tab status, the operator must first advance the display to Feature 7. Depressing the Feature Value key will cause the display to indicate up to a 4-digit number. The left-most digit will show a “1” if a tab is set, or a “0” if no tab is set. The right-most three digits indicate the column corresponding to the tab status. For example, the display will show a value of 1106 if a tab is set in column 106. A value of 0106 will be seen if no tab is set at column 106. The Display ▲ and Display ▼ keys are used to cycle the column number. Pressing the Set key sets a tab at the displayed column. Pressing the Clear key clears a tab at the displayed column.

2.4.6 Feature 8 - VERTICAL TABS

When a vertical tab code is received from the communications line, the paper advances to the next line at which a vertical tab stop has been set.

To set, clear, or view the tab status, the operator must first advance the display to Feature 8. Depressing the Feature Value key will cause the display to indicate up to a 4-digit number. The left-most digit will show a “1” if a tab is set, or a “0” if no tab is set. The right-most three digits indicate the line corresponding to the tab status. For example, the display will show a value of 1 26 if a tab is set at line 26. A value of 0 26 will be seen if no tab is set at line 26. The Display ▲ and Display ▼ keys are used to cycle the line number. Pressing the Set key sets a tab at the displayed line. Pressing the Clear key clears a tab at the displayed column.

2.4.7 Feature 9 - PRINT SIZE

The printer offers a choice of the horizontal pitches. In addition, in expanded print mode the printer offers double-wide characters.

Feature Value	Pitch
1	NLQ 10 pitch
5	OCRA (OPTIONAL)
6	OCRB (OPTIONAL)
10	10 pitch draft
12	12 pitch draft
13	13.3 pitch draft
15	15 pitch draft
16	16.7 pitch draft
17	17.5 pitch draft

To select the horizontal pitch:

1. Enter setup mode.
2. Advance the display to Feature 9.
3. Press the Feature Value key.
4. Advance the display to the desired value.
5. Press the Set key to store the feature.
6. Exit setup mode.

The printer also offers the user the capability of printing in more than one horizontal pitch on the same line. To prevent characters from overlapping when the horizontal pitch changes, the printer automatically calculates the print position for the first character of the new pitch.

2.4.8 Feature 10 - PRIMARY CHARACTER SET

Character sets are resident in the printer and can be selected either at the operator panel or via the communications line. The default character set is U.S. ASCII. The following is a table of the character sets and the front panel value. The primary character set is the printable characters in the ASCII range 0-127 inclusive.

NOTE

The printer provides the operator several methods for selecting primary and secondary character sets and the ability to modify character sets. In order to utilize the full potential of these features the operator should see Paragraphs 4.4.1 and 4.4.2.

Front Panel Value	Description	Available Modes
1	DS-180 U.S. ASCII	Draft, NLQ, OCR A (OPT), OCR B (OPT)
2	DS-180 U.K. ASCII	Draft, NLQ
3	DS-180 German	Draft, NLQ
4	DS-180 French	Draft, NLQ
5	DS-180 Swedish/Finnish	Draft, NLQ
6	DS-180 Norwegian/Danish	Draft, NLQ
7	DS-180 Greek	Draft, NLQ
8	DS-180 Spanish I	Draft, NLQ
9	APL	Draft*
10	IBM P.C. Secondary	Draft, NLQ, OCR A (OPT), OCR B (OPT)
11	DS-180 Spanish II	Draft, NLQ

* Not available with Bar Code Option

Table 2.2 Valid Nationalities

Front Panel Value	Description	Available Modes
12	DS-180 Custom (British Library)	Draft*
13	DS-180 CX/TX Secondary	Draft
14	Code Page 850 (Multilingual) Secondary	Draft*
15	DEC LA-120 U.S. ASCII	Draft
16	DEC LA-120 U.K. ASCII	Draft
17	DEC LA-120 Finland	Draft
18	DEC LA-120 Sweden	Draft
19	DEC LA-120 Norway/Denmark	Draft
20	DEC LA-120 German	Draft
21	DEC LA-120 France	Draft
22	Epson U.S.A.	Draft
23	Epson France	Draft
24	Epson German	Draft
25	Epson U.K.	Draft
26	Epson Denmark	Draft
27	Epson Sweden	Draft
28	Epson Italy	Draft
29	Epson Spain	Draft
30	Epson Japan	Draft
31	Epson U.S.A. Italics	Draft*

* Not available with Bar Code Option

Table 2.2 Valid Nationalities		
Front Panel Value	Description	Available Modes
32	Epson France Italics	Draft*
33	Epson German Italics	Draft*
34	Epson U.K. Italics	Draft*
35	Espon Denmark Italics	Draft*
36	Epson Sweden Italics	Draft*
37	Epson Italy Italics	Draft*
38	Epson Spain Italics	Draft*
39	Epson Japan Italics	Draft*

2.4.9 Feature 11 - VERTICAL PITCH SELECTION

For maximum flexibility, the printer offers programmable vertical pitch selection. The value shown in the digital display determines the number of motor steps (1/48 inches per step) of vertical paper motion that will occur upon receipt of a line feed code. For 6 lines per inch, this value should be set to 8.

2.4.10 Feature 13 - EMULATION MODE

By setting feature 13 to the desired value, the operator may set the printer to DS-180, EPSON FX-100 or LA-120 mode.

Mode	Front Panel Value	Escape Sequence
Datasouth DS-180	1	ESC\$F13;1.
Epson FX-100	6	ESC\$F13;6.
LA-120	8	ESC\$F13;8.

The escape sequences listed above are of the general form ESC \$ F n1 ; n2. where n1 is the number of the value feature (which is 13 in this case) and n2 is equal to the front panel value of the desired mode.

* Not available with Bar Code Option

2.4.11 Feature 15 - SECONDARY CHARACTER SET

The secondary character set is the printable characters in the ASCII range 128-255 inclusive. Refer to the table in paragraph 2.4.8.

2.4.12 Feature 23 - HIGH WATER MARK CONTROL

To define the high water mark (upper limit of character data buffer) of the incoming data First-In First-Out (FIFO), set Feature 23 to a value from 2 to 25. Each value is a 256-byte block that defines high water marks, which range from 512 to 6400 bytes. Feature 23 must have a greater value than Feature 25.

The printer goes busy on the active interface when the number of data bytes in the FIFO is greater than high water mark. The difference between the high water mark and low water mark is the current FIFO window.

VALUE	HIGH WATER MARK
2	512
3	768
4	1024
5	1280
6	1536
7	1792
8	2048
9	2304
10	2560
11	2816
12	3072
13	3328
14	3584
15	3840
16	4096
17	4352
18	4608
19	4864
20	5120
21	5376
22	5632
23	5888
24	6144
25	6400

2.4.13 Feature 25 - LOW WATER MARK CONTROL

To define the low water mark (lower limit of character data buffer) of the incoming data FIFO, set Feature 25 to a value from 1 to 24 (1 is the bottom of the FIFO). Each value is a 256-byte block that defines low water marks, which range from 256 to 6144 bytes. Feature 23 must have a greater value than Feature 25.

The printer goes not busy on the active interface when the number of data bytes in the FIFO is less than or equal to the low water mark. The difference between the high water mark and the low water mark is the current FIFO window.

VALUE	LOW WATER MARK
1	256
2	512
3	768
4	1024
5	1280
6	1536
7	1792
8	2048
9	2304
10	2560
11	2816
12	3072
13	3328
14	3584
15	3840
16	4096
17	4352
18	4608
19	4864
20	5120
21	5376
22	5632
23	5888
24	6144

The FIFO buffer has a high water mark and a low water mark. When the FIFO is filled to the high water mark, the printer raises **BUSY**, which signals the host to stop sending data. When the FIFO drops below the low water mark, the printer drops **BUSY**, which signals the host to send data. The buffer window is defined as the amount of memory between the high water mark and the low water mark.

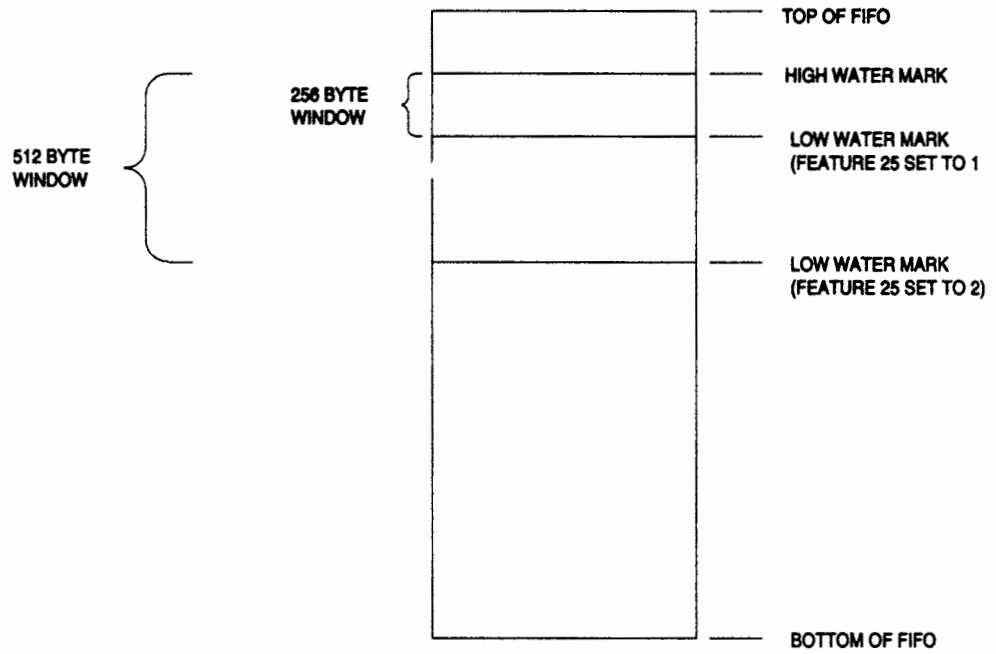


Figure 2.2 Buffer Control

2.5 SETTING DISCRETE FEATURES

Features 27 through 99 require an ON/OFF or ENABLE/DISABLE condition setting. These are referred to as Discrete features. The programming procedure is basically the same as that for value features except no numeric value is required. Instead, an ON or ENABLE condition is selected by pressing the Set key. A “1” displayed in the digital display indicates an ON condition. An OFF or DISABLE condition is selected by pressing the Clear key. A “0” displayed in the digital display indicates an OFF condition. The following example shows how to use the operator panel to enable the Bar Code enable (Feature 70) and to clear Power up on line (Feature 42).

1. Press the Off line key to take the printer off line.
2. Press the Enter Setup key to enter the setup mode.
3. Press the Display ▲ key until the display shows “70 0” (the feature we wish to change).

NOTE

If the user inadvertently advances beyond the desired number, the digital display may be decremented by pressing the Display ▼ key.

4. Press the Set key. The display will show “70 1”. This means that this feature is enabled.
5. If you wish to change another feature, press Display ▲ or Display ▼ until the desired feature number is displayed. In this example, press Display ▼ until the display shows “42 1”. Press the Clear key. The display will show “42 0”. This means that the feature is disabled.
6. Press Exit Setup to exit setup mode.
7. Press On Line to continue normal operation.

The above example depicts the appropriate procedure for programming features 27 through 99. A description of all discrete features which are available and instructions on how to program each follows.

NOTE

For future reference, record the setting for each discrete feature in Appendix F, or print a feature listing via Feature 98.

2.5.1 Feature 28 - PRINT INHIBIT

In certain applications, the user may wish to selectively enable or disable the printing of data received by the printer. This capability may be selected by enabling Feature 28. When enabled, a CONTROL S received by the printer via the communications line will inhibit the printing of received data. A CONTROL Q received via the communications line signals the printer to resume printing received data.

To disable the print inhibit capability, enter setup mode, advance to Feature 28, and press the Clear key. A "0" will be shown in the right-most column of the display. To enable the print inhibit capability, press the Set key. A "1" will then be shown.

2.5.2 Feature 30 - X-ON, X-OFF SYNCHRONIZATION PROTOCOL

X-on, X-off is a synchronization protocol for communications between the printer and computer. This feature allows the printer to control the data transmission from the computer through software codes in order to maximize throughput without overflowing the print buffer. The X-on, X-off control may also be programmed to stop transmission when an Error or Paper out condition has occurred.

XON/XOFF Protocol

When Feature 30 - XON/XOFF Synchronization is disabled, no software handshaking occurs.

When Feature 30 - Synchronization is enabled and Feature 86 - Modem Control is disabled, XON/XOFF handshaking occurs as follows:

XOFF is sent when:

- the printer is powered down
- fifo goes full
- paper goes out
- the printer goes offline
- data activity is initiated on parallel interface

XON is sent when:

- the printer is powered up
- fifo goes not full AND paper in AND printer online
- parallel data activity ceases AND fifo not full AND paper in AND printer online

When Feature 30 - XON/XOFF Synchronization is enabled and Feature 86 - Modem Control is enabled, XON/XOFF handshaking occurs as follows:

XOFF is sent when:

- fifo goes full

XON is sent when:

- fifo goes not full

When Feature 84 - Robust XOFF Protocol is disabled, an XOFF will be sent only once in response to multiple or reoccurring busy conditions. When Feature 84 - Robust XOFF Protocol is enabled, XOFFs will continuously be sent in response to multiple or reoccurring busy conditions.

2.5.3 Feature 31 - DTR SYNCHRONIZATION PROTOCOL

Data Terminal Ready (DTR) restraint mode is a synchronization protocol between the printer and computer. This feature allows the printer to control the data transmission from the computer by monitoring the status of the DTR line on the RS232 interface. This enables the printer to maximize throughput without overflowing the print buffer.

DTR Protocol

When Feature 31 - DTR Synchronization is disabled, the DTR signal will always be in the READY condition.

When Feature 31 - DTR Synchronization is enabled and Feature 86 - Modem Control is disabled, the DTR signal will operate as a normal handshaking signal and will indicate a BUSY condition when any of the following conditions exist:

- fifo full
- paper is out
- the printer is offline
- the parallel interface is active (receiving data)

2.5.4 Feature 32 - PARITY

Feature 32 is used in conjunction with Feature 33. When Feature 32 is enabled, Feature 33 is used to select even or odd parity. When Feature 32 is disabled, Feature 33 has no function.

2.5.5 Feature 33 - EVEN/ODD PARITY SELECTION

Parity Selection (Feature 32 enabled): To select even parity, Feature 33 should be disabled. To select odd parity, Feature 33 should be enabled.

2.5.6 Feature 34 - AUTOMATIC WRAP

The printer may be configured to automatically execute a carriage return and line feed when the printhead reaches the right margin. To enable this capability, Feature 34 should be set to 1. If Feature 34 is set to 0, any data after the right margin is not printed.

2.5.7 Feature 36 - AUTOMATIC LINE FEED

The printer may be configured to automatically perform a line feed upon receipt of a carriage return command. To enable Auto Line Feed, Feature 36 should be set to 1.

2.5.8 Feature 37 - AUTOMATIC CARRIAGE RETURN

The printer may be configured to automatically perform a carriage return upon receipt of a paper movement command such as a line feed, form feed, or vertical tab. To enable Auto Carriage Return, Feature 37 should be set to 1.

2.5.9 Feature 38 - FORM FEED DEFEAT

The printer normally performs a form feed upon receipt of a CONTROL L command from the communications line. In some cases, the user may wish to defeat this capability. To enable the Form Feed Defeat, Feature 38 should be set to 1.

NOTE

The form feed defeat is sensitive only to the CONTROL L command received from the communications line. The Form Feed key on the front panel will still generate a form feed.

2.5.10 Feature 39 - 6/8 LINES PER INCH

The vertical pitch may be set at either 6 or 8 lines per inch. To program the vertical pitch, enter setup mode and advance the display to 39. To set the pitch at 6 lpi, press the Clear key. To set the pitch at 8 lpi, press the Set key. Changing the vertical pitch via Feature 11 overrides this feature without updating the display.

2.5.11 Feature 40 - PAPER OUT DETECTION OVERRIDE

A photo sensor is embedded in the paper guide below the print line. When Feature 40 is set to 0, and a paper out condition occurs, a stop transmission command will be sent to the computer via the synchronization protocol currently programmed into the printer. In addition, the paper out indicator on the front panel will flash continuously and an audio alarm will sound three short tones. When the forms have been reloaded and aligned in the printer, press the Continue key. The paper-out indicator will cease to flash and printing will resume. Since the content of the buffer is retained and then printed when operation is resumed, no data is lost during a paper-out condition. The paper-out detection may be overridden by setting Feature 40 to 1.

2.5.12 Feature 41 - SHIFT OUT SELECTS DOUBLE WIDE PRINT

The function of SHIFT OUT, SHIFT IN, ESC\$5 AND ESC\$6 is controlled by the setting of Feature 41 as follows:

With Feature 41 set to 0:

SHIFT OUT selects double wide print
SHIFT IN selects normal print
ESC\$5 selects secondary character set
ESC\$6 selects primary character set

With Feature 41 set to 1:

SHIFT OUT selects secondary character set
SHIFT IN selects primary character set
ESC\$5 selects double wide print
ESC\$6 selects normal print

2.5.13 Feature 42 - POWER-UP ON LINE/OFF LINE

The printer may be powered up in either on line or off line condition depending on user preference. When Feature 42 is enabled, the printer will power-up in the on line condition. When Feature 42 is disabled, the printer will power-up in the off line condition.

This setting also governs the status of the machine if the Reset key is depressed. If Feature 42 is enabled, depressing the Reset key will restore the printer to the left margin and place it on line.

2.5.14 Feature 43 - SERIAL INTERFACE DISABLE

When set to 1, Feature 43 causes the printer to ignore any data sent to it over the serial interface. This prevents the possibility of erroneous characters entering the FIFO buffer.

2.5.15 Feature 44 - AUTOMATIC PRINT DISABLE

Feature 44 allows the user to enable (or disable) an automatic print feature.

When Feature 44 is set to 0, the printer will automatically print any characters which have accumulated in the print buffer after a 1-second delay period. Note that the 1-second timer is reset upon the receipt of each new character. Thus, the auto-print feature will not activate a print cycle unless there is more than 1-second between two characters. Further, the logical position of the printer is not disturbed (i.e., no paper motion occurs and any characters sent later will be printed in their proper column).

2.5.16 Feature 45 - EXIT DOUBLE WIDE PRINT ON LINE TERMINATOR

When Feature 45 is enabled, the printer will automatically drop out of expanded print and begin printing normal print upon receiving any valid line terminator (carriage return, line feed, form feed or vertical tab).

NOTE

Applies only to DS-180 emulation and double wide selected by shift-out.

2.5.17 Feature 46 - ESCAPE SEQUENCE DISABLE

Escape sequence sensitivity may be disabled by setting Feature 46 to 1. This may be required should the printer be used on a system which uses Escape sequences for purposes other than printer control.

2.5.18 Feature 47 - DISPLAY MODE

When Feature 47 is set to 1 the printer will print 255 distinct display mode characters to represent incoming data. All display mode characters are given in Appendix D.

NOTE

Feature 61 must be set to 1 to access characters 127-255.

2.5.19 Feature 48 - SECONDARY CHARACTER SET ENABLE

Setting Feature 48 to 1 selects the secondary character set (as defined by Feature 15) as the character set to be printed.

2.5.20 Feature 49 - GRAPHICS (ANADIX 9500/9501 COMPATIBLE)

Feature 49 determines the capability to select between graphics or character mode. The actual entry into graphics printing is controlled by the codes described in Chapter 4. This feature must be enabled in order to enter graphics.

2.5.21 Feature 51 - UNIDIRECTIONAL TEXT PRINTING

When Feature 51 is enabled, all text will be printed unidirectionally. When Feature 51 is disabled, all text will be printed bidirectionally.

2.5.22 Feature 59 - HANDSHAKE ON BUSY

This feature allows compatibility with systems which do not strictly comply with the Centronics standard. When Feature 59 is set to 1 the host must honor the BUSY signal. When Feature 59 is set to 0 buffer control may be accomplished with the ACK signal. See Paragraph 3.4 for more information on parallel interfacing.

2.5.23 Feature 60 - ALTERNATE GRAPHICS CONTROL

The control codes used to enter and exit graphics vary depending on the setting of Feature 60. When Feature 60 is set to 0 the control codes used to control graphics are as follows:

Enter graphics	(CHR\$(28)) FS
Exit graphics with line feed correction	(CHR\$(29)) GS
Exit graphics with no line feed correction	(CHR\$(3)) Acknowledge Handshaking

When Feature 60 is set to 1 the control codes used to control graphics are as follows:

Enter graphics	(CHR\$(5)) ENQ
Exit graphics with line feed correction	(CHR\$(6)) ACK
Exit graphics with no line feed correction	(CHR\$(3)) Acknowledge Handshaking

2.5.24 Feature 61 - EIGHTH BIT ENABLE

When Feature 61 is set to 1 the printer will honor the eighth bit when communicating with an 8-bit device. When Feature 61 is 0, the eighth bit is forced low.

2.5.25 Feature 63 - ETX/ACKNOWLEDGE HANDSHAKING

When communicating over the serial interface the operator may set Feature 63 to enable an ETX/ACKNOWLEDGE handshaking protocol. When Feature 63 is set to 1, handshaking will occur as follows: The host will end each series of data sent to the printer with ETX. When the printer detects ETX in the First-In First-Out (FIFO) buffer, it sends acknowledge to the host.

2.5.26 Feature 66 - PARALLEL INTERFACE DISABLE

When set to 1, Feature 66 causes the printer to ignore any data sent over the parallel interface.

2.5.27 Feature 70 - BAR CODE ENABLE (WITH BAR CODE OPTION)

Feature 70 is set to 1 to enable bar code printing capabilities. Setting Feature 70 to 0 will disable bar code capabilities.

2.5.28 Feature 71 - ACKNOWLEDGE AFTER BUSY

Feature 71, in conjunction with Feature 59, Handshake on Busy, controls the signal timing for the parallel interface. The specific function of Feature 71 is to determine when Acknowledge is issued. When Feature 71 is set to 0, Acknowledge is issued before Busy. When Feature 71 is set to 1, Acknowledge is issued after Busy. The following Diagrams illustrate the signal timing options of the parallel interface.

Figure 2.3 illustrates the signal timing when Feature 59 is set to 0 and Feature 71 is set to 0.



Figure 2.3. Handshake on Acknowledge, Acknowledge Before Busy

Figure 2.4 illustrates the signal timing when Feature 59 is set to 1 and Feature 71 is set to 0.

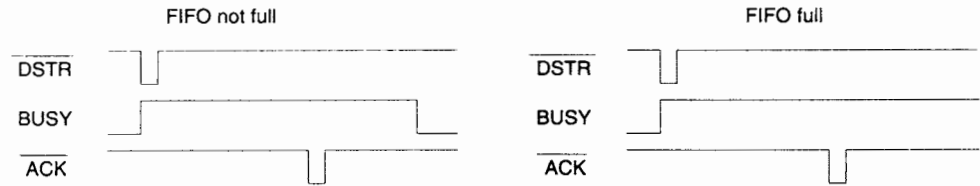


Figure 2.4. Handshake on Busy, Acknowledge Before Busy

Figure 2.5 illustrates the signal timing when Feature 59 is set to 1 or 0 and Feature 71 is set to 1.

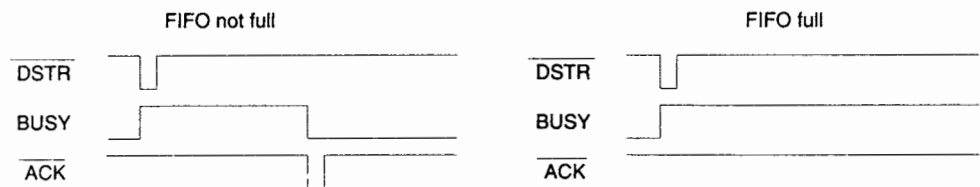


Figure 2.5 Acknowledge After Busy

2.5.29 Feature 80 - SERIAL 7 OR 8 DATABIT COMMUNICATIONS

This feature controls how many data bits are transmitted and received by the serial port. When this feature is set to 1, eight data bits will be used. When this feature is set to 0, seven data bits will be used. This feature has no effect on communications through the parallel interface.

2.5.30 Feature 81 - TRANSMIT 8TH BIT SET ON SERIAL

This feature allows the user to force the eighth bit high when the printer transmits to the host using the serial interface. When the feature is enabled, all transmitted data will have the eighth bit high. When the feature is disabled, the eighth bit will be transmitted unchanged.

2.5.31 Feature 84 - TRANSMIT MULTIPLE XOFFs

This feature allows the user to enable the transmission of an XOFF character for each character received during a busy condition. When Feature 84 is set to 0, only one XOFF character will be transmitted across the serial interface during a busy condition. When Feature 84 is set to 1, a XOFF character will be transmitted for each character received during a busy condition.

2.5.32 Feature 85 - HEAVY FORMS CONTROL

This feature allows the user to move the print head away from the page perforations of heavy forms during form feeds. When Feature 85 is enabled, the print head will be moved to a position two inches beyond the right margin whenever a formfeed character is processed. When feature 85 is disabled, no print head movement will occur in response to a form feed. The right margin feature must be properly set in order for this feature to function properly.

If Feature 4 - Bottom Margin is set, any paper motion (LF, VT, or FF) causing the paper to be fed beyond the bottom margin will also cause the print head to be moved to a position two inches beyond the right margin and a form feed to be executed.

2.5.33 Feature 86 - MODEM CONTROL *

This feature will alter the operation of the XON/XOFF and DTR handshaking protocols, of the serial interface, to be more compliant with the data transmission requirements of a modem. The operation of the XON/XOFF handshaking protocol is now dependent on the selection of Feature 30 - XON/XOFF Synchronization Protocol, Feature 84 - Robust XOFF Protocol, and Feature 86 - Modem Control. The operation of the DTR handshaking protocol is now dependent on the selection of Feature 31 - DTR Synchronization Protocol and Feature 86 - Modem Control.

2.5.34 Feature 94 - FORM FEED CONTROL

Feature 94 provides the user with a method for controlling where the printer will position the form when the printer receives a form feed. When Feature 94 is set to 0, the printer will slew to the top margin of the next form when it receives a form feed.

When Feature 94 is set to 1, the printer will slew to the top of form of the next form when the printer receives a form feed. The printer will not slew to the top margin until the printer receives the next data. Upon receiving the next data, the printer will slew to the top margin and begin normal printing.

2.5.35 Feature 96 - DOUBLE STRIKE PRINT

Feature 96 enables double strike mode. When in this mode, the printer will print each line twice in order to improve the print quality when using multipart forms. Each line of print is printed in two passes at normal print speed. Double strike is enabled when Feature 96 is set to 1.

2.5.36 Feature 98 - FEATURE LISTING

Feature 98 is a useful diagnostic tool which allows the operator to check the status of all discrete and value features. When Feature 98 is set, the printer will produce a two-column printout which identifies each feature by the feature number and the present setting of each feature. To perform a feature listing, proceed as follows:

1. Depress the Enter Setup key.
2. Depress the Display ▼ key so the number 98 is displayed.
3. Depress the Set key to start the feature listing.

Upon completion of step three, the printer will begin printing the feature listing and will automatically stop after completing the printout.

2.5.37 Feature 99 - PRINT-TEST/ASCII RIPPLE PATTERN

A preprogrammed print routine may be activated to verify proper operation of the printer. A rotating or "ripple" pattern of the 94 ASCII characters will be printed during the test. To initiate the feature, enter setup mode and advance the display to Feature 99. Then press the Set key and the printer will begin printing. The Clear key must be pressed to stop the printing.

2.5.38 DOWNLINE PROGRAMMING OF DISCRETE FEATURES

All discrete features can be enabled or disabled via the communications line by using an escape sequence. The format of the escape sequence is ESC\$ s (for set) or c (for clear) then feature number.

* Not available on TX and CX units.

EXAMPLE:

To enable Feature 70 (bar code) from the host, send sequence ESC\$s70.

To disable Feature 70 from the host, send sequence ESC\$c70.

3 INTERFACING

3.1 INTRODUCTION

Interfacing with the printer may be accomplished by two methods: EIA RS-232-C serial interface or TTL level 8-bit parallel interface. Connectors for both types of interface are located on the back of the printer as shown in Figure 1.2.

To properly interface, first determine the interface needed, acquire the correct cable (either serial or parallel) and plug it into the correct connector on the printer and the host device. Test data should be sent to the printer to see if the interface is complete. If interfacing cannot be accomplished by the method described above, proceed to the applicable paragraph below for more detailed information.

NOTE

When connecting the printer to a host computer system, always use shielded cables to comply with FCC rules governing a Class A computing device.

3.2 SERIAL INTERFACE

This printer features an EIA RS-232-C serial interface which is accessed through the 25-pin D-connector on the back of the printer (see Figure 1.2). Although the RS-232-C interface is considered to be an industry standard, there exists different connector pin assignment conventions (e.g. pin 2 may not always be designated serial data out). Because of such variations, it may be necessary to connect the interface on a pin-by-pin basis. The technician must compare the connector pin assignments of the host to the printer and make certain the interface is made by connector pin assignment and not by pin number.

The length of the interface cable should not exceed 15 feet. On the printer end of the cable use a TRW CINCH (housing no. DB-51226-1-A, connector no. DB-25P) or an AMP (housing no. 206478-3, pin no. 66506-4, connector no. 205208).

The connector pin assignment configuration for the printer serial interface is given in Table 3-1.

Table 3.1 Serial Interface Connector Pin Assignment	
PIN	ASSIGNMENT
1	Chassis Ground
2	Serial Data Out - Asynchronous output data line
3	Serial Data In - Asynchronous input data line
7	Signal Ground
11 and 20	Data Terminal Ready (DTR) - Indicates the printer is open for communication and can accept or transmit data

The jumper positions provided on the controller board (see Figure 3.1) allow the user to modify the serial interface by configuring pins 4, 5 and 6 as desired. R26 - R29 should be 3.3K, 1/4 W, 5% resistors.

<p>NOTE Do not use chassis ground as signal ground.</p>
--

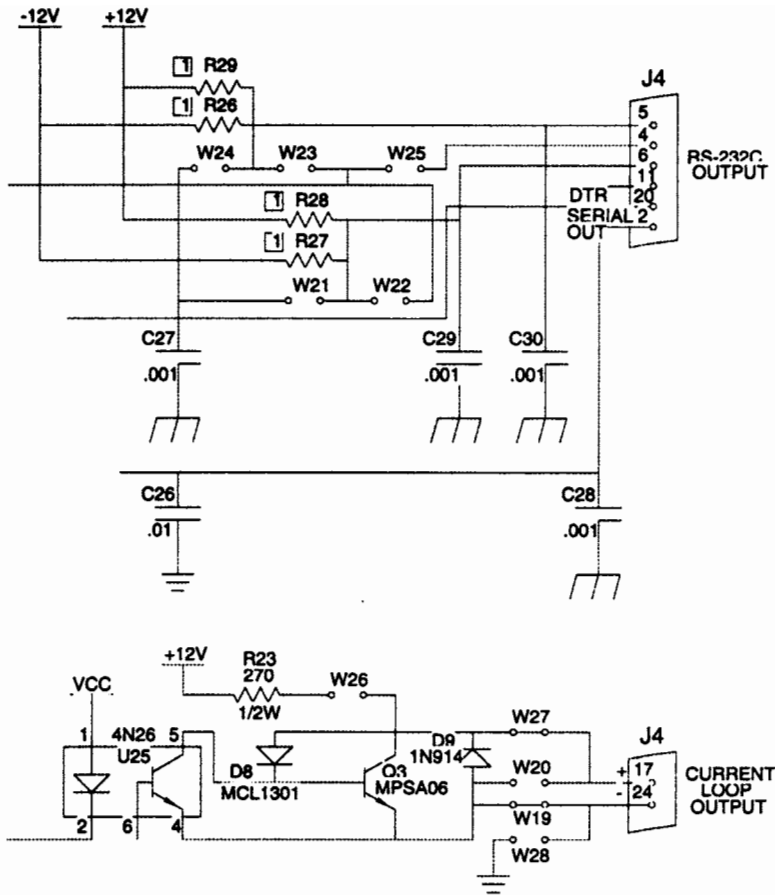


Figure 3.1 Serial Interface (Controller Board)

3.3 20 mA CURRENT LOOP INTERFACE

An optional feature available on the printer is a 20 mA Photo-isolated current loop interface with the following configuration:

PIN	ASSIGNMENT
17	Current Loop TX+
23	Current Loop RCV+
24	Current Loop TX-
25	Current Loop RCV-

Both the RS232 and current loop interfaces are accessed through the 25-pin D-connector on the rear panel of the printer.

3.4 PARALLEL INTERFACE

The TTL level 8-bit parallel interface can be accessed through the 36-pin female connector on the back of the printer (see Figure 1.2).

The parallel interface provides the user with a simple, high speed interface for communications with a CPU or host system. Operating with parallel data in lieu of serial offers the following advantages:

1. Elimination of serial encoders and decoders
2. No requirement for a BAUD rate clock
3. Inherent synchronization

The printer and host exchange information on a character-by-character basis. The host initiates the action by presenting to the printer a character. After a brief setting time, a data strobe is issued by the host. The printer takes the character from its interface circuitry and puts it in a line buffer. Then a ready signal is sent to the host indicating that another character may be sent.

3.4.1 HANDSHAKING

Acknowledge—Busy before Acknowledge or Busy after Acknowledge

Busy—Acknowledge before Busy or Acknowledge after Busy

Two output signals control the handshaking on the parallel interface: BUSY and ACKNOWLEDGE. An incoming DATA STROBE will cause BUSY to go high.

Feature 59 and Feature 71 control handshaking capabilities. Refer to Chapter 2 (Paragraphs 2.5.22 and 2.5.28) for illustrations of the signal timing options of the parallel interface.

The parallel interface is a TTL type with the receiver and driver configuration shown in Figure 3.2. Figure 3.3 shows the timing diagram for the printer.

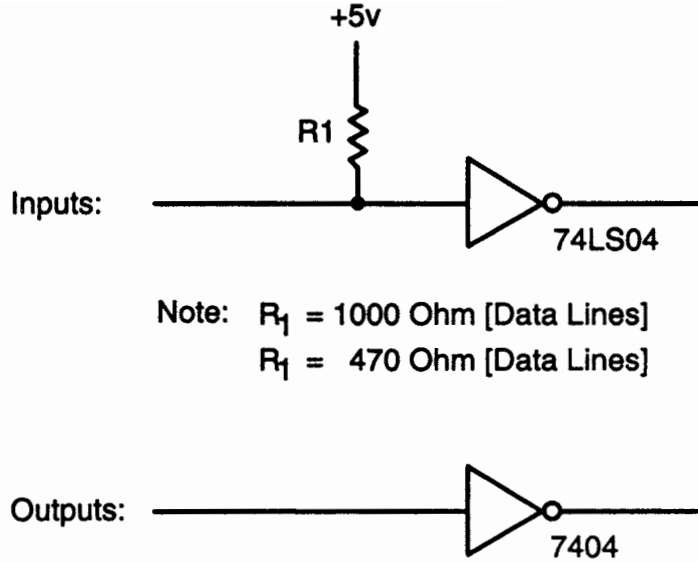
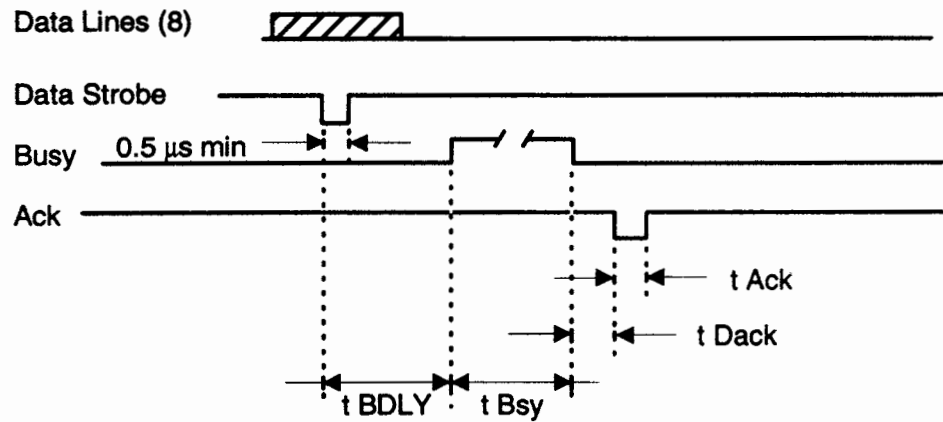


Figure 3.2 Receiver and Driver Configuration



BDLY: min. = 250 ns
max. = 400 ns
BSY: min. = 100 μs
max. = 4 sec
ACK: = 3 μs
DACK: max. = 20 ns

Figure 3.3 Parallel Data Timing (upwards Centronics Compatible)

Parallel interface connectors have different connector pin assignment conventions (e.g. pin 11 may not always be assigned Busy). Because of such variations, it may be necessary to connect the interface on a pin-by-pin basis. The technician must compare the connector-pin assignments of the host to those of the printer and make certain the interface is made by connector-pin assignment and not by pin number. The connector-pin assignment configuration for the parallel interface is given in Table 3-2.

NOTE

If it is necessary to construct an interface cable, the length of the cable should not exceed 10 feet.

Pin Number	Assignment
1	Data Strobe
2	Data Bit 1
3	Data Bit 2
4	Data Bit 3
5	Data Bit 4
6	Data Bit 5
7	Data Bit 6
8	Data Bit 7
9	Data Bit 8
10	Acknowledge
11	Busy
12	Paper Out or Print Off
13	Logic +5V
14	Ground
15	---
16	Ground
17	Chassis Ground

Table 3.2 Parallel Interface Connector Pin Assignment

Pin Number	Assignment
18	---
19	*Twisted Pair Ground
20	*Twisted Pair Ground
21	*Twisted Pair Ground
22	*Twisted Pair Ground
23	*Twisted Pair Ground
24	*Twisted Pair Ground
25	*Twisted Pair Ground
26	*Twisted Pair Ground
27	*Twisted Pair Ground
28	*Twisted Pair Ground
29	*Twisted Pair Ground
30	*Twisted Pair Ground
31	---
32	Logic +5V
33	Ground
34	---
35	---
36	---

*Grounds are effective only if twisted pair cabling is used.

4 PROGRAMMING

4.1 INTRODUCTION

This section describes the graphics, the control codes, and escape sequences that are used to control the printer through the communications interface.

4.2 CONTROL COMMANDS

Various features may be controlled using ASCII standard control commands, (see Table 4.1). These features may be controlled through the user program or they may be controlled in real time from the terminal. For example, to command a line feed in a basic program the user would enter CHR\$(10), where 10 is the decimal value for the ASCII character LF (Line Feed). To command a line feed in real time from the terminal, the user would enter CTRL J.

Table 4.1 provides the user with all control commands and the decimal value for each. The column entitled Control Character is for troubleshooting purposes. The characters shown in this column are what the user will see printed when the printer is in display mode (see Paragraph 2.5.18 for a complete explanation of the display mode).


Table 4.1 Control Commands			
Control Code	Description	Control Character	Decimal Value
CTRL G	Bell		7
CTRL H	Back Space	B _S	8
CTRL I	Horizontal Tab	H _T	9
CTRL J	Line Feed	L _F	10
CTRL K	Vertical Tab	V _T	11
CTRL L	Form Feed	F _F	12
CTRL M	Carriage Return	C _R	13
CTRL N	Shift-out (see Table 4.2)	S _O	14
CTRL O	Shift-in (see Table 4.2)	S _I	15
CTRL Q	X-on	D ₁	17
CTRL S	X-off	D ₃	19

Table 4.2 Shift-out/Shift-in Functions		
Emulation	Shift-out	Shift-in
Epson	Selects double wide	Cancel double wide
LA-120	Selects alternate character set	Cancel alternate character set
DS-180	Selectable	Selectable

4.3 ESCAPE SEQUENCES

Escape sequences may be used within a program to control certain printer functions and to modify certain operating parameters of the printer (e.g. tab stop, pitch). The escape sequences provided in Table 4.3 are compatible with ANSI specifications provided that each sequence is formatted exactly as indicated.

In these sequences, n is used as a variable. The variable must be replaced by an integer when entering the escape sequence. For example, to set the active line to line 10, substitute 10 for n and enter LPRINT CHR\$(27);"[10d";. Make certain the values that are entered for n are not erroneous. Numbers which exceed the maximum or are below the minimum value for n will cause the printer to default.

Certain conditions which may cause the printer to default when using escape sequences are given below.

1. No control codes are allowed in an escape sequence. The sequence is aborted if a control code is detected before the sequence is completed.
2. If n is set to zero or a negative number or if n is set too high (132 for 10 pitch, 217 for 16 pitch) n will default to 1.
3. A maximum of 15 vertical or 15 horizontal tabs per escape sequence are allowed. An attempt to set additional tabs will be rejected and the bell will sound once. It may be desirable to first clear all tabs before a sequence is sent to set additional ones.
4. The programmer should not send any spaces in the escape sequences. The spaces shown in Table 4.3 are for readability only.

Table 4.3 Common Mode Escape Sequences	
Escape Sequences Available In All Emulations	
ESC \$ 1	Turn on continuous underline
ESC \$ 2	Turn off continuous underline
ESC \$ 3	Turn on display mode
ESC \$ 4	Turn off display mode
ESC \$ 5	See Feature 41
ESC \$ 6	See Feature 41
ESC \$ 7	Half Line feed
ESC \$ 8	Reverse Half Line feed
ESC \$s nn	Set any discrete feature
ESC \$c nn	Clear any discrete feature
ESC * h=N	Remap character from library*
ESC \$@	Reset character set to standard
ESC \$Fn1; n2.	Set Feature n1 to n2

Table 4.4 DS-180 Mode Escape Sequences	
SEQUENCE	FUNCTION
FORMAT CONTROL	
ESC [n '	Set active column to column n (next print positio.). Note: ' is ASCII code 60H.
ESC [n a	Advance active column by n columns
ESC E	Set active column to left column and perform line feed

* Not available with Bar Code Option

Table 4.4 DS-180 Mode Escape Sequences	
SEQUENCE	FUNCTION
ESC D	Line Feed
ESC [n d	Set active line to line n
ESC [n e	Advance active line by n lines
ESC [n t	Set form length to n lines
CARRIAGE CONTROL	
ESC [20 h	Enable carriage return on receipt of LF, FF or VT
ESC [20 l	Disable carriage return on receipt of LF, FF or VT Note: l is ASCII code 6CH
MARGINS	
ESC [n s	Set left margin to column n
ESC [; n s	Set right margin to column n
ESC [n1; n2 s	Set left margin to column n1 and set right margin to column n2
ESC [n r	Set top margin to line n
ESC [; n r	Set bottom margin to line n
ESC [n1; n2 r	Set top margin to line n1 and set bottom margin to line n2
TABS	
ESC 1	Set horizontal tab stop at active column
ESC [g	Clear horizontal tab stop at active column
ESC 2	Clear all horizontal tab stops
ESC [2 g	Clear all horizontal tab stops
ESC [3 g	Clear all horizontal tab stops
ESC [n u	Set horizontal tab stop at column n

Table 4.4 DS-180 Mode Escape Sequences

SEQUENCE	FUNCTION
ESC [n1; n2;...nx u (max. of 15 horizontal tabs)	Set horizontal tab stops at column n1, n2, ... nx
ESC 3	Set vertical tab stop at active line
ESC [1 g	Clear vertical tab stop at active line
ESC 4	Clear all vertical tab stops
ESC [4 g	Clear all vertical tab stops
ESC [n v	Set vertical tab stop at line n
ESC [n1; n2; ...nx v (max. of 15 vertical tabs)	Set vertical tab stops at line n1, n2, ... nx
LINE SPACING	
ESC [0 z	Set vertical pitch to 6 lpi
ESC [1 z	Set vertical pitch to 6 lpi
ESC [2 z	Set vertical pitch to 8 lpi
ESC [3 z	Set vertical pitch to 12 lpi
ESC [4 z	Set vertical pitch to 2 lpi
ESC [5 z	Set vertical pitch to 3 lpi
ESC [6 z	Set vertical pitch to 4 lpi
CHARACTER SETS	
ESC (A	Select U.K. ASCII character set
ESC (B	Select U.S. ASCII character set
ESC (C or ESC (H	Select Swedish/Finnish character set
ESC (D	Select Spanish I character set
ESC (E	Select Norwegian/Danish character set
ESC (G	Select Greek character set

Table 4.4 DS-180 Mode Escape Sequences	
SEQUENCE	FUNCTION
ESC (I	Select IBM character set
ESC (J	Select Spanish II character set
ESC (K	Select German character set
ESC (L	Select Custom character set I
ESC (R	Select French character set
HORIZONTAL PITCH	
ESC [1w	Select 10 cpi
ESC [2w	Select 12 cpi
ESC [3w	Select 13.3 cpi
ESC [4w	Select 16.7 cpi
ESC [5w	Select 5 cpi
ESC [6w	Select 6 cpi
ESC [7w	Select 6.6 cpi
ESC [8w	Select 8.3 cpi

4.3.1 EPSON MODE ESCAPE SEQUENCES

In the escape sequences listed in Table 4.5, n1 and <n1> are both used as a variable. When the variable n1 is used, the value of n1 is represented by the ASCII character 0 - 9. When the variable <n1> is used, the value of <n1> is represented by the decimal equivalent of an ASCII character and the value of <n1> is sent as a character string See Paragraph 4.3.1 for examples. Feature 13 must be set to a value of 6 in order to use the escape sequences listed in Table 4.5. Epson Mode Escape Sequences

Table 4.5 Epson Mode Escape Sequences

ESCAPE SEQUENCE	FUNCTION
PAPER FEED COMMANDS	
ESC J <n>	Advance n/216 inch. (Rounded to nearest n/48)
ESC j <n>	Reverse feed n/216 inch. (Rounded to nearest n/48)
ESC 0	1/8" line spacing
ESC 1	7/72" line spacing (5/ 48)
ESC 2	1/6" line spacing
ESC 3 <n>	n/216" line spacing (nearest /48")
ESC A <n>	n/72" line spacing (nearest / 48")
HORIZONTAL PITCH	
ESC M	Set elite pitch
ESC P	Set pica pitch
ESC W n1	Set (n=1)/cancel (n=0) enlarged mode
ESC SO	Set enlarged mode
ESC SI	Cancel enlarged mode
ESC E	Emphasized mode enable
ESC F	Emphasized mode disable
FEATURES	
ESC _ n	Set(n=1)/cancel (n=0) underline print mode
ESC 8	Paper out detection disable
ESC 9	Paper out detection enable
ESC @	Printer re-initialization
ESC I <n>	Print mode selection
CHARACTER SETS	
ESC 4	Select alternate character set

Table 4.5 Epson Mode Escape Sequences	
ESCAPE SEQUENCE	FUNCTION
ESC 5	Cancel alternate character set
ESC R <n>	International character set selection. n Nationality 0 USA 1 France 2 Germany 3 England 4 Denmark 5 Sweden 6 Italy 7 Spain 8 Japan
ESC &	Download character definition
ESC %	CG (Character Generator) selection
ESC x n \	n=0 or <0> Draft n=1 or <1> NLQ
ESC :	ROM CG (Character Generator) set copy
ESC 6	Expand printable code region
ESC 7	Cancel expand printable code region
ESC I n1	Control code selection enable (1)/disable (0)
FORMAT CONTROL	
ESC D n1..n15<00>	Set horizontal tab n1...n15
ESC / n	VFU channel selection
ESC B n1..n15<00>	Set vertical tab n1...n15
ESC b	Sets VFU position
ESC C <n1>	Set forms length to n1 lines
ESC C <00> <n1>	Set forms length to n1 inches
ESC N n1	Set skip-over perforation to n1
ESC O	Cancel skip-over perforation
ESC Q <n1>	Set right margin to n1

Table 4.5 Epson Mode Escape Sequences	
ESCAPE SEQUENCE	FUNCTION
ESC I <n1>	Set left margin to n1
EIGHTH BIT CONTROL	
ESC =	Set MSB to 0
CARRIAGE CONTROL	
ESC >	Set MSB to 1
ESC #	Cancel MSB control
ESC <	Print one line unidirectional
ESC U <n1>	Unidirectional print mode enable/disable
GRAPHICS	
ESC K	60 DPI graphics
ESC L	120 DPI graphics
ESC Y	120 DPI graphics (Double speed)
ESC Z	240 DPI graphics (Double speed)
ESC * <n>	Graphics mode selection. n Mode 0 60 DPI 1 120 DPI 2 120 DPI (Double Speed) 3 240 DPI (Double Speed) 4 80 DPI 5 72 DPI 6 90 DPI
ESC ? <n1 n2>	Assign bit image mode. n1 = K, L, Y or Z n2 = 0 - 6
ESC ^ <n>	Nine bit image mode n Mode 0 60 DPI 1 120 DPI

4.3.2 LA-120 ESCAPE SEQUENCES

In the escape sequences listed below, n1 and <n1> are both used as a variable. When the variable n1 is used, the value of n1 is represented by the ASCII character 0 - 9. When the variable <n1> is used, the value of <n1> is represented by the decimal equivalent of a ASCII character and the value of <n1> is sent as a character string. Feature 13 must be set to a value of 8 in order to use the escape sequences listed in Table 4.6.

Table 4.6 LA-120 Escape Sequences	
ESCAPE SEQUENCE	FUNCTION
ACTIVE COLUMN AND LINE	
ESC [n '	Set active column to n
ESC [n a	Advance active column by n
ESC E	Carriage return/linefeed
ESC D	Linefeed
ESC [n d	Set active line to n
ESC [n e	Advance active line by n
ESC [n t	Set form length to n
LINE FEED NEWLINE MODE	
ESC [20 h	Carriage return on LF, FF or VT
ESC [20 l	Disable carriage return on LF, FF or VT
HORIZONTAL MARGINS	
ESC [n s	Set left margin to column n
ESC [; n s	Set right margin to column n
ESC [n1 ; n2 s	Set left and right margins
ESC [n r	Set top margin to n
ESC [; n r	Set bottom margin to n

Table 4.6 LA-120 Escape Sequences	
ESCAPE SEQUENCE	FUNCTION
ESC [n1 ; n2 r	Set top and bottom margin
HORIZONTAL TABS	
ESC 1	Set horizontal tab at active column
ESC H	Set horizontal tab at active column
ESC [g or ESC [0 g	Clear horizontal tab at active column
ESC 2	Clear all horizontal tabs
ESC [2 g	Clear all horizontal tabs
ESC [3 g	Clear all horizontal tabs
ESC [n u	Set horizontal tab at n
ESC [n1 ; nx u	Set horizontal tabs at n1 - n16
VERTICAL TABS	
ESC 3	Set vertical tab at active line
ESC J	Set vertical tab at active line
ESC [1 g	Clear vertical tab at active line
ESC [4 g	Clear all vertical tabs
ESC 4	Clear all vertical tabs
ESC [n v	Set vertical tab at n
ESC [n1 ; nx v	Set vertical tabs at n1 - n16
VERTICAL PITCH	
ESC [0 z	Set vertical pitch to 6 lpi
ESC [1 z	Set vertical pitch to 6 lpi
ESC [2 z	Set vertical pitch to 8 lpi

Table 4.6 LA-120 Escape Sequences	
ESCAPE SEQUENCE	FUNCTION
ESC [3 z	Set vertical pitch to 12 lpi
ESC [4 z	Set vertical pitch to 2 lpi
ESC [5 z	Set vertical pitch to 3 lpi
ESC [6 z	Set vertical pitch to 4 lpi
CHARACTER SETS	
ESC (A	Select U.K. character set
ESC (B	Select U.S. character set
ESC (C	Select Finland character set
ESC (E	Select Norway/Denmark character set
ESC (H	Select Sweden character set
ESC (K	Select German character set
ESC (R	Select French character set
HORIZONTAL PITCH	
ESC [1 w	Selects 10 cpi
ESC [2 w	Selects 12 cpi
ESC [3 w	Selects 13.3 cpi
ESC [4 w	Selects 16.7 cpi
ESC [5 w	Selects 5 cpi
ESC [6 w	Selects 6 cpi
ESC [7 w	Selects 6.6 cpi
ESC [8 w	Selects 8.3 cpi
PRODUCT IDENTIFICATION	
ESC [c or ESC [0 c	Request for ID send ESC [?2c

4.4 CHARACTER SETS

The printer is capable of printing 433 distinct characters. These characters are arranged into twelve standard character sets (see Appendix C) which can be selected from the front panel or down line through the use of escape sequences. The printer also provides the user with the capability to modify character sets. The following paragraphs provide more information on selecting character sets and use of the library for altering character sets.

4.4.1 CHARACTER SET SELECTION

The operator must select either the primary or the secondary character set as the “active” character set. The “active” character set will be printed when the printer is operated. Several methods for selecting the active character set are described below.

The setting of Feature Number 48 determines which character set will be printed. When Feature Number 48 is set to 0 (the default value of Feature Number 48) the primary character set is active. The operator may select the secondary character set to be printed by setting Feature Number 48 to 1.

The operator may also select the active character set (the set that will be printed) using SHIFT IN and SHIFT OUT or by using escape sequences. The setting of Feature Number 41 determines which method may be used to select the active character set. When Feature Number 41 is set to 0, SHIFT IN selects the primary character set and SHIFT OUT selects the secondary character set. When Feature Number 41 is set to 1, ESC\$6 selects the primary character set and ESC\$5 selects the secondary character set.

Another method for selecting the active character set is through the use of the eighth bit. When Feature Number 61, Eighth Bit Enable, is set to 1, computers which utilize the eighth bit may select the active character set by setting the eighth bit high or low. When the eighth bit is set low, the primary character set is selected; when the eighth bit is set high the secondary character set is selected.

4.4.2 CHARACTER SET MODIFICATION*

The user is provided with the capability of modifying any of the twelve standard character sets. By sending the proper escape sequence, the user may replace any character in the active character set with a character in the library. The user may replace only one character, or if a complete modification is desired, the user may replace every character in a character set.

NOTE

This feature is active only when Feature Number 9 is set to a draft mode. Only the active character set may be altered.

* Not available with Bar Code Option

4.5 GRAPHICS

The printer offers dot-addressable raster-scan graphics (Anadex 9500/9501 and Epson FX-100 compatible). This allows the user to print computer generated charts, graphs, maps and other pictorial images which help present data in a concise readable form.

If the host system is not equipped with graphics software, the user must purchase or write a graphics driver program. The purpose of a graphics driver program is to convert information displayed on the screen to information the printer can use.

4.5.1 GRAPHICS (ANADEx 9500/9501 COMPATIBLE)

When the printer is placed into the DS-180 graphics mode it no longer prints characters in predefined groups. In this mode of operation the user can control each print wire independently. This section will instruct the user on how to manipulate the print wires in order to “draw” a specific figure. The user should understand that the following instructions are intended only to describe the fundamentals of encoding, not to demonstrate the most efficient way of programming a particular figure. This is left to the programming expertise of the user.

The user can control the top six print wires in printer graphics, (see Figure 4.1). A “column” is then six dots high and one dot wide.

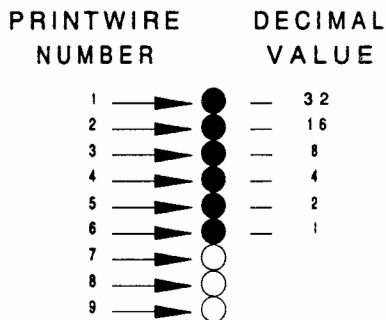


Figure 4.1 Print Wires

As shown in Figure 4.1, each print wire has a decimal value assigned to it. A print wire is fired by sending the decimal value that corresponds to that print wire. For example, to fire print wire number 2, the user would send `CHR$(16)`. If more than one print wire is to be fired, the decimal values of the print wires number 2 and number 4, `CHR$(20)` would be sent. Print wire number 2 has a decimal value of 16 and print wire number 4 has a decimal value of 4. The sum of the decimal values is 20.

In order to print a figure using the individual print wire control described above, the figure must first be plotted on graph paper as individual dots. Because of the high resolution used in graphics (e.g. 72 dots per inch) it will be necessary to plot the figure at a scale greater than 1 to 1 in order to plot individual dot positions.

Figure 4.2 is an example of how to plot a figure as individual dots in graphics mode. The figure at the tallest point is 36 dots high. With a vertical resolution of 72 dots per inch the printed figure will be 1/2 inch tall. At the widest point the figure is 35 dots wide. With a horizontal resolution of 75 dots per inch the printed figure will be just under 1/2 inch wide (by two and one-half dots). Notice also that the two smaller columns are 24 dots tall (1/3 inch) and 18 dots tall (1/4 inch).

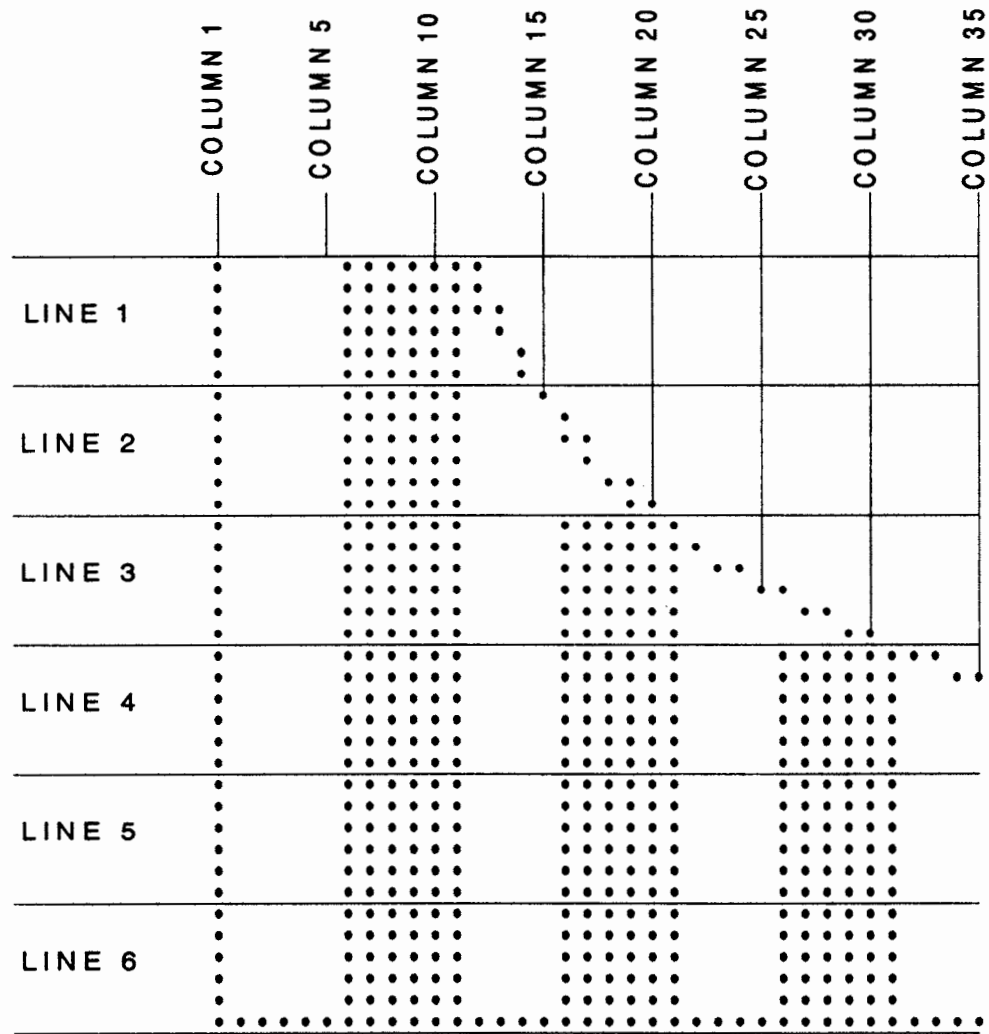


Figure 4.2 Graphics Figure

Since six print wires can be controlled in graphics, the figure should be divided into lines (see Figure 4.2), each six dots tall (the height of one column). Notice, after dividing the figure, that the printhead must make six passes to complete the figure. The user must examine each line, beginning with line 1 and determine which print wires must be fired for each column. In column 1 of line 1, all six print wires must be fired. Adding the decimal value of all six wires (see Figure 4.1 for the value of each wire), gives column 1 a value of 63.

NOTE

In graphics mode, a graphics byte must have bit 7 set to 1 to be a legal graphics byte. Therefore, when calculating the value of each column of graphics the value of bit 7 (which is 64) must be added to the value of the print wires. The resulting value for column 1 is then 127 (63 plus the value of bit 7).

Column 2 contains no dots and therefore column 2 has a value of 64 (0 plus bit 7). This is also true for columns 3, 4 and 5. In column 6 all six print wires are fired so column 6 has a value of 127 (63 plus bit 7). Columns 7, 8, 9, 10 and 11 also have a value of 127. In column 12 only the top two print wires are fired so column 12 has a value of 112 (48 plus bit 7). Column 13 has a value of 76 (print wires 3 and 4 are fired). Column 14 has a value of 67 (print wires 1 and 2 are fired).

The procedure of determining the value for every column must be performed for each of the six lines. The value for each column (in parenthesis) in lines 2 through 6 is given below.

NOTE

The values given below include the value of bit 7.

- Line 2. Column 1, (127); columns 2 through 5, (64); columns 6 through 11, (127); columns 12, 13 and 14, (64); column 15, (96); column 16, (88); column 17, (76); column 18, (66); column 19, (67); column 20, (65).
- Line 3. Column 1, (127); columns 2 through 5, (64); columns 6 through 11, (127); columns 12 through 15, (64); columns 16 through 21, (127); column 22, (80); column 23 and 24, (72); column 25 and 26, (68); column 27 and 28, (66); column 29 and 30, (65).
- Line 4. Column 1, (127); columns 2 through 5, (64); columns 6 through 11, (127); columns 12 through 15, (64); columns 16 through 21, (127); column 22 through 25, (64); column 26 through 31, (127); columns 32 and 33, (96); columns 34 and 35, (80).
- Line 5. Column 1, (127); columns 2 through 5, (64); columns 6 through 11, (127); columns 12 through 15, (64); columns 16 through 21, (127); column 22 through 25, (64); columns 26 through 31, (127).

Line 6. Column 1, (127); columns 2 through 5, (65); columns 6 through 11, (127); columns 12 through 15, (65); columns 16 through 21, (127); column 22 through 25, (65); columns 26 through 31, (127); columns 32 through 35, (65).

In order to send the value for each column of graphics and print the figure, the user must first enter graphics mode.

NOTE
Feature Number 49 must be enabled in order to enter graphics.

Graphics mode is entered by sending an Anadex FS (CHR\$(28) in BASIC) to the printer. The printer will remain in the graphics mode until commanded to exit. Except for FS, Acknowledge Handshaking, GS and the line terminator each byte must have bit 7 set to 1 to be a legal graphics byte. Each line of graphics is terminated by receipt of an ASCII numeral 0 through 9. This code terminates the graphics line and advances the paper "n" dot increments where "n" equals the single digit line terminator 0 through 9.

The forms control alignment may be maintained when in graphics mode. Top-of-form, perforation skipover and vertical tabs will be executed as programmed.

A horizontal indent may be programmed by sending the sequence ;nnn where "nnn" equals an ASCII decimal number. The indent will be "nnn" horizontal dot positions from the left margin. Example: LPRINT";25" causes an indent of 25 dot positions (1/3 inch). This sequence may be sent immediately after the FS code or after the line terminator. The indent command sequence must immediately precede a printable graphics byte.

To exit graphics mode the user must send (CHR\$(29) GS or CHR\$(3) Acknowledge Handshaking in BASIC). Exiting graphics using the GS control code corrects for any variations in the line feed boundary caused by the graphics line terminator. Exiting graphics using the Acknowledge Handshaking control code does not correct the line feed boundary. The Acknowledge Handshaking control code must be used to print ASCII characters and graphics on the same line. (See sample program in paragraph 4.4.2).

The information to print Figure 4.2 can now be sent to the printer. Make certain Feature Number 49 is enabled before attempting to enter graphics mode. Sending CHR\$(28) instructs the printer to enter graphics. This is followed by the values for the columns in line 1. If the value for each column is entered individually it will appear as follows:

```
CHR$(127);CHR$(64);CHR$(64);CHR$(64);CHR$(64);CHR$(127);CHR$(127);  
CHR$(127);CHR$(127);CHR$(127);CHR$(127);CHR$(112);CHR$(76);CHR$(67);
```

The graphics line is terminated with a "6" which advances the paper by 6 dot increments. The printer will automatically perform a carriage return. The graphics data for lines 2 through 6 is entered in the same manner.

A sample graphics program is provided in paragraph 4.4.2. Notice that the sample is made up of diamonds formed by the bit pattern sent to the printer in statement 230 of the program. The value for each column which makes up the diamond is shown in Figure 4.3.

NOTE

Some systems are designed to automatically perform a carriage return and line feed after receiving 132 bytes. In order to complete a full line of graphics, (which typically exceeds 132 bytes) this feature must be disabled.

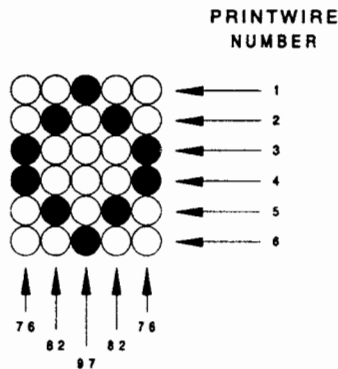


Figure 4.3 Diamond Pattern

In statement 80 of the sample program, CHR\$(14) is the Shift-Out character. This causes the printer to print expanded characters. The CHR\$(141) is actually a carriage return with the eighth bit equal to 1. At the end of the printable ASCII characters in statement 80 it is important to give a carriage return without a line feed. This is difficult on some computers that have automatic line feed after carriage return. A CHR\$(13) is normally a carriage return, but in this case it was necessary to raise the eighth bit (add 128 to 13) which prevents an automatic line feed from following the carriage return.

NOTE

To run the sample graphics program, features 29, 61 and 49 must be enabled. Features 36 and 47 must be disabled.

SAMPLE GRAPHICS PROGRAM

```
20 OPEN "TT10:" FOR OUTPUT AS FILE #1
25 PRINT #1,,CHR$(28); REM ENTER GRAPHICS
30 GOSUB 200: REM DRAW TOP OF BOX
40 FOR P=1 TO 3
50 GOSUB 300: REM DRAW TOP HALF OF LEFT & RIGHT SIDES
60 NEXT P
70 PRINT #1,,CHR$(3);
71 REM EXIT GRAPHICS WITHOUT CORRECTING LINEFEED BOUNDARY
80 PRINT #1,, " ";CHR$(14);"THE PRINT";CHR$(141);
81 REM CHR$(14) = SHIFT TO DOUBLE-WIDE
82 REM CHR$(141) = CHR$(13) = CARRIAGE RETURN
83 REM THE CARRIAGE RETURN TERMINATES
84 REM THE ASCII LINE AND SHIFTS OUT
85 REM OF DOUBLE-WIDE PRINT
90 PRINT #1,,CHR$(28); REM ENTER GRAPHICS
100 FOR P=1 TO 4
110 GOSUB 300: REM DRAW BOTTOM HALF OF LEFT & RIGHT SIDES
120 NEXT P
130 GOSUB 200: REM DRAW BOTTOM OF BOX
140 PRINT #1,,CHR$(29) REM EXIT GRAPHICS & CORRECT LINEFEED BOUNDARY
150 GOTO 500
200 REM THIS SUBROUTINE DRAWS TWO LINES OF DIAMONDS
205 REM EACH LINE 36 DIAMONDS LONG
210 FOR M=1 TO 2
220 FOR N=1 TO 36
230 PRINT #1,,CHR$(76);CHR$(82);CHR$(97);CHR$(82);CHR$(76);
240 NEXT N
250 PRINT #1,, "6";
260 NEXT M
270 RETURN
300 REM THIS SUBROUTINE DRAWS THE TWO DIAMONDS AT THE LEFT
305 REM AND RIGHT SIDES OF THE BOX
320 PRINT #1,,CHR$(76);CHR$(82);CHR$(97);CHR$(82);CHR$(76);
325 PRINT #1,,CHR$(76);CHR$(82);CHR$(97);CHR$(82);CHR$(76);
330 PRINT #1,, "0";
355 PRINT #1,, "170";CHR$(76);CHR$(82);CHR$(97);CHR$(82);CHR$(76);
360 PRINT #1,,CHR$(76);CHR$(82);CHR$(97);CHR$(82);CHR$(76);
365 PRINT #1,, "6";
370 RETURN
500 END
```



4.5.2 EPSON FX-100 GRAPHICS

The printer must be set to Epson mode to utilize Epson FX-100 Graphics (see Feature Number 13 for proper setting). When the printer is placed into the Epson graphics mode it no longer prints characters in predefined groups. In this mode of operation the user can control each print wire independently. This section will instruct the user on how to manipulate the print wires in order to “draw” a specific figure. The user should understand that the following instructions are intended only to describe the fundamentals of encoding, not to demonstrate the most efficient way of programming a particular figure. This is left to the programming expertise of the user.

The user can control the top eight print wires in Epson graphics. (See Figure 4.4). A “column” is then eight dots high and one dot wide.

NOTE
 The interfacing in some systems will not support eight bits.
 These systems can control only seven print wires,
 (numbers 2 through 8).

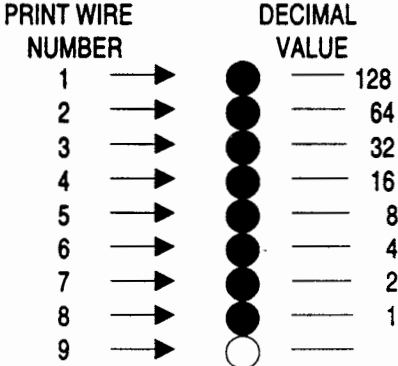


Figure 4.4 Print Wires (Epson Graphics)

As shown in Figure 4.4, each print wire has a decimal value assigned to it. A print wire is fired by sending the decimal value that corresponds to that print wire. For example, to fire print wire number 2, the user would send CHR\$(64). If more than one print wire is to be fired, the decimal values of the print wires to be fired are added, and the sum is sent. For example, to fire print wires number 2 and number 4, CHR\$(80) would be sent. Print-wire number 2 has a decimal value of 64 and print wire number 4 has a decimal value of 16. The sum of the decimal values is 80.

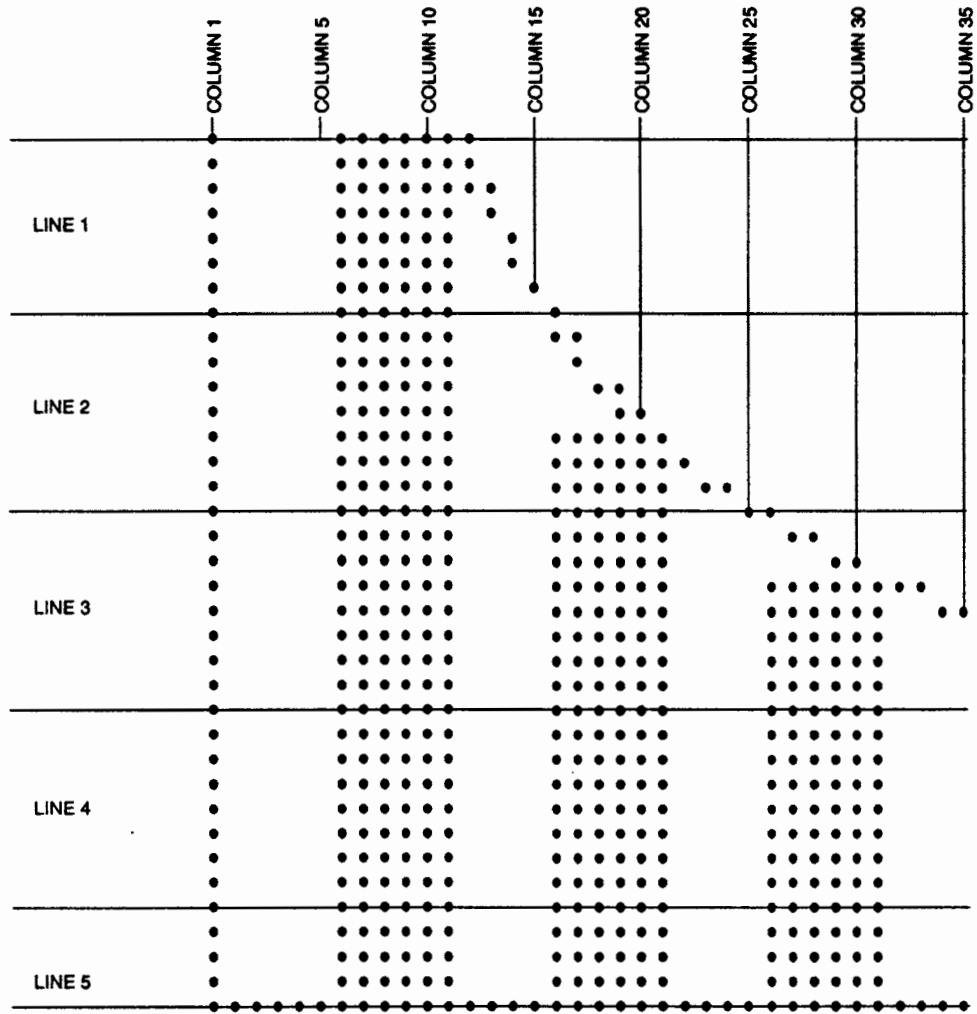


Figure 4.5 Graphics Figure (Epson Graphics)

Since eight print wires can be controlled in Epson graphics, the figure should be divided into lines (see Figure 4.5), each eight dots tall (the height of one column). Notice, after dividing the figure that the printhead must make five passes to complete the figure with only four print wires being utilized on the fifth pass. The user must examine each line, beginning with line 1 and determine which print wires must be fired for each column. In column 1 of line 1, all eight print wires must be fired. Adding the decimal value of all eight wires (see Figure 4.4) for the value of each wire), gives column 1 a value of 255. Column 2 has no dots and therefore column 2 has a value of 0. This is also true for columns 3, 4 and 5. In column 6 all eight print wires are fired so column 6 has a value of 255. Columns 7, 8, 9, 10 and 11 also have a value of 255. In column 12 only the top three wires are fired so column 12 has a value of 224. Column 13 has a value of 48 (print wires 3 and 4 are fired). Column 14 has a value of 12 (print wires 5 and 6 are fired). Column 15 has a value of 2 (print wire number 7 is fired). Column 16 has a value of 1 (print wire number 8 is fired).

The procedure of determining the value for every column must be performed for each of the 5 lines. It is also important to document the number of columns contained in each line. The number of columns contained in each line and the value for each column (in parenthesis) is given below.

Line 2 contains 26 columns. Column 1 (255); columns 2 through 5, (0); columns 6 through 11, (255); columns 12 through 15, (0); column 16, (143); column 17, (207); column 18, (47); column 19, (63); column 20, (31); column 21, (15); column 22, (4); columns 23 and 24, (2); columns 25 and 26, (1).

Line 3 contains 35 columns. Column 1, (255); columns 2 through 5, (0); columns 6 through 11, (255); columns 12 through 15, (0); columns 16 through 21 (255); columns 22 through 25, (0); column 26, (63); columns 27 and 28, (191); column 29 and 30, (127); column 31, (63); columns 32 and 33, (32); columns 34 and 35, (16).

Line 4 contains 31 columns. Column 1, (255); columns 2 through 5, (0); columns 16 through 11, (255); columns 12 through 15, (0); columns 16 through 21, (255); columns 22 through 25, (0); columns 26 through 31, (255).

Line 5 contains 35 columns. Column 1, (240); columns 2 through 5, (16); columns 6 through 11, (240); columns 12 through 15, (16); columns 16 through 21, (240); columns 22 through 25, (16); columns 26 through 31, (240); columns 32 through 35, (16).

In order to send the value for each column and print the figure, the user must first enter Epson graphics mode. This is done by sending the printer a sequence of four codes.

FORMAT: ESC *K* N1 N2

The ESC "K" instructs the printer to enter single density Epson graphics. N1 and N2 designate the number of graphics bytes (number of columns) that are to be sent to the printer.

NOTE:

The printer will "hang-up" if the number of graphics bytes sent is less than that specified by N1 and N2. Also, the printer exits graphics mode after receiving the number of graphics bytes specified by N1 and N2. Any bytes the printer receives after exiting graphics mode will be printed as text mode characters.

The total number of graphics bytes specified by N1 and N2 is determined by the following equation:

$$N1 + (N2 \times 256) = \text{Total number of graphics bytes}$$

N1 can range from 0 to 255. N2 can range from 0 to 7.

NOTE:

N2 values greater than 7 are interpreted Modulo 8. The printer interprets them as the remainder after they are divided by 8. For example, 8, 16 and 24 each equal 0 (there is 0 remainder after any of them are divided by 8); 9, 17 and 25 each equal 1 (the remainder is 1 after any of them are divided by 8); 15, 23 and 31 each equal 7, etc.

Example: CHR\$(27); "K"; CHR\$(7); CHR\$(1)

CHR\$(27) is the escape code and "K" specifies single density graphics. The number of graphics bytes specified by N1 and N2 is:

$$7 + (1 \times 256) = 263 \text{ graphics bytes}$$

To specify 100 graphics bytes N1 must have a value of 100 and N2 a value of 0.

$$100 + (0 \times 256) = 100 \text{ graphics bytes}$$

NOTE:

For computers that will not send 0, an 8 or any multiple of 8 can be substituted for 0 in n1 or n2.

To specify 300 graphics bytes N1 must have a value of 44 and N2 a value of 1.

$$44 + (1 \times 256) = 300 \text{ graphics bytes}$$

In single density graphics the maximum line width is 816 dots. To specify 816 graphics bytes N1 must have a value of 48 and N2 a value of 3.

The user may also choose double density Epson graphics by sending ESC "L" N1 N2. N1 and N2 have the same meaning as in the ESC "K" sequence. In double density graphics the printhead moves over only half the normal distance each time the printhead fires. This causes the dots to overlap on the horizontal plane producing a horizontal resolution of 120 dots per inch. In double density graphics the maximum line width is 1632 dots. To specify 1632 graphics bytes N1 must have a value of 96 and N2 a value of 6.

ESC "K" sets graphics mode to single density graphics (816 dots per 13.6 inch line)

Format: ESC "K" N1 N2

$$\text{Line Length} = N1 + (N2 \times 256)$$

$$0 < N1 < 255$$

$$0 < N2 < 7 \text{ (Modulo 8, i.e. } 8 = 0)$$

ESC "L" sets graphics mode to double density graphics (1632 dots per 13.6 inch line)

Format: ESC "K" N1 N2

Line Length = N1 + (N2 X 256)

0 <N1 <255

0 <N2 <7 (Modulo 8, i.e. 8 = 0)

ESC A CHR\$(n) - selects vertical line spacing in whole dot increments. Substituting an 8 for n will advance the paper 8/72 inch or by 8 dots.

The information to print Figure 4.5 can now be sent to the printer. The first line of Figure 4.5 contains 16 columns (or graphics bytes). Therefore N1 will have a value of 16 and N2 a value of 0.

NOTE:
Before sending the escape sequence to enter graphics, Feature Number 13 must be set to 6.

The sequence to enter single density graphics and specify 16 columns of graphics will be CHR\$(27);"K";CHR\$(16);CHR\$(0);. The value of each of the 16 columns in line 1 will immediately follow this so the value for each column is entered individually it will appear as follows:

```
CHR$(255);CHR$(0);CHR$(0);CHR$(0);CHR$(0);CHR$(55);CHR$(255);CHR$(255);  
CHR$(255);CHR$(255);CHR$(255);CHR$(192);CHR$(48);CHR$(12);CHR$(2);CHR$(1);.
```

The graphics line is ended with a carriage return and line feed. Line 2 contains 26 columns so N1 would have a value of 26 and N2 a value of 0. To print line 2 the printer must be instructed to re-enter graphics mode by sending CHR\$(27);"K";CHR\$(26);CHR\$(0); which is immediately followed by the graphics data for line 2. Line 2 is terminated with a carriage return and line feed and the procedure is repeated for lines 3, 4 and 5.

A sample graphics program is provided on page 4-34. Notice that the sample is made up of diamonds formed by the bit pattern sent to the printer in statement 230 of the program. The value for each column which makes up the diamond is shown in Figure 4.6.

NOTE:
Some systems are designed to automatically perform a carriage return and line feed after receiving 132 bytes. In order to complete a full line of graphics, (which typically exceeds 132 bytes) this feature must be disabled.

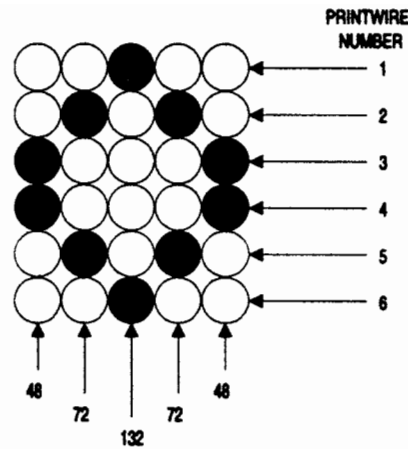


Figure 4.6 Diamond Pattern (Epson Graphics)

In statement 80 of the sample program, CHR\$(14) is the Shift-Out character. This causes the printer to print expanded characters. The CHR\$(141) is actually a carriage return with the eighth bit equal to 1. At the end of the printable ASCII characters in statement 80 it is important to give a carriage return without a line feed. This is difficult on some computers that have automatic line feed after carriage return. A CHR\$(13) is normally a carriage return, but in this case it was necessary to raise the eighth bit (add 128 to 13) which prevents an automatic line feed from following the carriage return.

NOTE:
 To run the sample graphics program, feature 61 must be enabled. Features 36 and 47 must be disabled.

4.5.3 SAMPLE GRAPHICS PROGRAM (Epson Graphics)

```
20 OPEN "TTIO:" FOR OUTPUT AS FILE #1
25 PRINT #1,CHR$(27);"A";CHR$(6);
30 GOSUB 200: REM DRAW TOP OF BOX
40 FOR P= 1 TO 8
50 GOSUB 300: REM DRAW LEFT & RIGHT SIDES
60 NEXT P
130 GOSUB 200: REM DRAW BOTTOM OF BOX
150 GOTO 500
200 REM THIS SUBROUTINE DRAWS TWO LINES OF DIAMONDS,
205 REM EACH LINE 36 DIAMONDS LONG.
210 FOR M = 1 TO 2
215 PRINT #1,CHR$(27)"K";CHR$(180);CHR$(0);
220 FOR N = 1 TO 36
230 PRINT #1,CHR$(48);CHR$(72);CHR$(132);CHR$(72);CHR$(48);
240 NEXT N
250 PRINT #1
260 NEXT M
270 RETURN
300 REM THIS SUBROUTINE DRAWS THE TWO DIAMONDS AT THE LEFT
305 REM AND RIGHT SIDES OF THE BOX
310 PRINT #1,CHR$(27);"K";CHR$(180);CHR$(0);
320 PRINT #1,CHR$(48);CHR$(72);CHR$(132);CHR$(72);CHR$(48);
325 PRINT #1,CHR$(48);CHR$(72);CHR$(132);CHR$(72);CHR$(48);
330 FOR I = 1 TO 160
340 PRINT #1,CHR$(0);
350 NEXT I
355 PRINT #1,CHR$(48);CHR$(72);CHR$(132);CHR$(72);CHR$(48);
360 PRINT #1,CHR$(48);CHR$(72);CHR$(132);CHR$(72);CHR$(48);
365 PRINT #1
370 RETURN
500 END
```



4.6 BAR CODE PRINTING (OPTIONAL)

In order to use bar code printing capabilities, Feature 70 must be set to 1. Setting Feature 70 to 0 will disable bar code capabilities. Feature 70 should be set to 0 whenever the user is not printing bar codes. The command sequence to print bar codes is as follows:

`^B a x d d..... d ^G`

The command sequence parameters are described in the following matrix. Not all bar code symbols are available in every bar code package.

^B	The "caret" "B" is a required two character entry sequence. (Not Control B.)					
The "a" parameter determines what type of readable character is printed below the bar code.	Y turns on non-OCR printing (DRAFT)					
	O turns on OCR-A printing. (If printer has OCR-A option.)					
	B turns on OCR-B (If printer has OCR-B option)					
	D defaults to font and nationality selected by Feature 9 and Feature 10.					
	Any other character produces no print under bar code.					
The "x" parameter determines what type of bar code to print.	<i>Parameter</i>	<i>Type</i>	<i>Comment</i>	<i>Product Family Availability</i>		
				<i>ASCII STD Bar Code</i>	<i>ASCII Code 128</i>	<i>ASCII EAN/UPC</i>
	A	CODE 39	Low density 3.75 CPI	X	X	X
	B	CODE 39	Med.density 4.3 CPI	X	X	X
	C	CODE 39	Med.density 5.7 CPI	X	X	X
	D	Interleaved 2 of 5	Low density 7.6 CPI	X		
	E	Interleaved 2 of 5 (Not available with code 128)	Medium density 8.4 CPI	X		
	P	UPC A				X
	Q	UPC E	10 digit			X
	R	UPC E	6 digit			X
	T	EAN 13				X
	U	EAN 8				X
Z	CODE 128 (Not available with Interleaved 2 of 5)	Variable, depending on data		X		
ddd...d	Bar code data to print. Characters other than those supported by a particular bar code type are ignored. Up to 40 characters can be entered for a single bar code.					
^G	The "caret" "G" is a required two character sequence terminator. (Not Control G.)					

The printer automatically inserts a start and stop character when printing bar codes.

Interleaved 2 of 5 will print an even number of characters only. The printer will automatically insert a leading 0 if needed.

Various bar code print samples are provided in Figure 4.7.

```
LPRINT "^BNBCODE 39^G"
```



```
^BOZCode 128^G
```



Code 128

Figure 4.7 Bar Code Samples

4.6.2 SUPPORTED BARCODE CHARACTERS

Each barcode symbology has a unique set of characters available to be printed. These sets are listed below:

Code 39 supported characters:

0-9
A-Z
[space] - . \$ / + %

Interleaved 2 of 5 supported characters:

0-9

Code 128 supported characters:

Full ASCII

4.6.3 SAVE AND RESTORE VERTICAL POSITION

The escape sequences ESC \$ H and ESC \$ B, enable the user to print multiple bar codes on the same line. ESC \$ H stores the current vertical position. ESC \$ B backs the paper to the vertical position which was saved by ESC \$ H.

In order to print multiple bar codes on the same line, the escape sequences should be used as follows:

```
Send ESC $ H
Send data for the first bar code.
Send ESC $ B
Send data for next bar code.
```

A sample program and printout are provided below.



```
10 LPRINT CHR$(27);"#H^BNABC 1^G      ";
20 LPRINT CHR$(27);"#B^BNABC 2^G"
```

Figure 4.9 Bar Code Sample

4.6.4 CODE 128 BAR CODES

The Code 128 bar code symbology allows the printing of the first 128 characters of the ASCII character set. Control Code characters may be embedded directly in the data portion of the bar code request. Control Code characters may also be embedded by using a special feature. A > sign preceding a character in the decimal range 64-95 will be converted to the character which is 64 less than the value. For example, both an ASCII value of 0 and the pair >@ will be interpreted as a NULL character.

The Code 128 bar code symbology will provide the start character and mode change characters which will provide the shortest bar code. However, it is possible to override this feature by defining start characters or other mode characters as a part of the data stream. Data which follows a mode shift will be converted to the value representing the character and output. No human readable text will be printed if the data contains Control Codes or special mode shift characters.

Table 4.7 Special > Codes	
Symbol Pair	Resulting Value
>0	>
>1	95
>2	96 - FNC 3
>3	97 - FNC 2
>4	98 - Shift
>5	99 - Code C
>6	100 - Code B
>7	101 - Code A
>8	102 - FNC 1

If the value following a > sign is not in the above table and also not in the decimal range 64-95, no decoding will occur. For example, the sequence >9 will result in the values for > and 9 appearing in the output.

5 OPERATOR MAINTENANCE AND TROUBLESHOOTING

5.1 INTRODUCTION

Before you call for service, read this section. It contains solutions that can save you down time and money. If you do need to contact someone for service, please have your printer model and serial number available.

This chapter gives helpful maintenance and troubleshooting procedures. These procedures require no special knowledge of electronics or printers. Any troubleshooting or maintenance beyond the level presented in this chapter should be performed by a qualified technician.

5.2 MAINTENANCE

WARNING

Disconnect the printer from the AC power supply before reaching into the printer to perform any cleaning task.

CAUTION

Do not use any cleaners, solvents, or lubricants on any of the working parts of the printer.

Clean your printer about every three months. To clean the printer, use a vacuum cleaner with a plastic nozzle to remove dirt from the carriage, paper guides and platen. As often as necessary, remove accumulated dirt from the carriage rods and the platen with a dry, lint-free cloth. Clean the printer cover with a commercial cleaner such as 409. To clean the access window, use a soft non-abrasive cloth rather than paper products.

5.3 TROUBLESHOOTING

If your printer is not working properly, please review the following procedures.

WARNING
**Disconnect the printer from the AC power supply
before performing any procedure
that requires reaching into the printer.**

5.3.1 CHECK FEATURES FIRST

To ensure proper feature settings:

1. Refer to the feature settings recorded in Appendix F.
2. Print a feature listing to verify that feature settings have not been reset by another operator or by software commands from the host computer.

To print a feature listing:

- Press the Off line key.
- Press the Enter Setup key.
- Press the Display ▼ key until the number 98 is displayed.
- Press the Set key to start printing.

NOTE: If the printer does not respond and no printing occurs, see Section 5.3.2.

3. Compare the two lists. If necessary, reset the feature settings to match those recorded in Appendix F. If the problem still exists, review the following.

Problem	Solution
Narrow column of print.	Verify the correct setting for margins. Check Feature 5 for the left margin. Check Feature 6 for the right margin.
Paper feeds through printer continuously.	Incorrect baud rate for serial connection. Check Feature 1.
Printer will not communicate when using parallel interface.	Check Features 59 and/or 66. See Appendix F for default feature settings.
Printer will not communicate when using serial interface.	Check Feature 43. See Appendix F for default feature settings.

Problem	Solution
Printer appears to print more slowly.	<p>The following conditions can make the printer appear to be slower:</p> <ul style="list-style-type: none"> Feature 9 (NLQ) is turned on. Feature 51 (Unidirectional) is turned on. Feature 96 (Doublestrike) is turned on.
Paper tearing on right or left side.	<p>Reset the right margin using Feature 6. This ensures that the printhead does not move past the edge of the paper.</p> <p>Move form slightly to the left so edge of printhead does not leave the paper. This may require the user to reset the left margin with Feature 5.</p>
Paper won't advance.	<p>Verify the correct setting of Features 2, 3, 11 and 39. For information on how to set these features, see Chapter 2.</p>
Error codes displaying on operator panel.	<p>Error code 6508 is a non-volatile memory fault. Press the Continue key to load the default values in place of the programmed features settings. You will have to reload any Features that were programmed into the printer.</p> <p>If the error persists, contact the dealer.</p> <p>Error code 1111 can indicate some debris on the margin sensor or broken cables. Check for and remove the debris. Check for broken cables. If damaged, contact the dealer.</p>

5.3.2 Performing a Default Reset

If the printer continues to ignore data sent from the host computer, perform a default reset. Note that when you perform a default reset, the printer loads the factory-set features list. To reload your features, see the features list in Appendix F.

To perform a default reset, turn the printer ON, press and hold the Clear key while pressing the Reset key.

5.4 WHEN THE PROBLEM IS NOT RELATED TO FEATURES

The following errors are presented in four groups:

- 5.4.1 General Printer Operation
- 5.4.2 Print Format and Quality
- 5.4.3 Paper Feed Problems
- 5.4.4 Printer Connection Problems

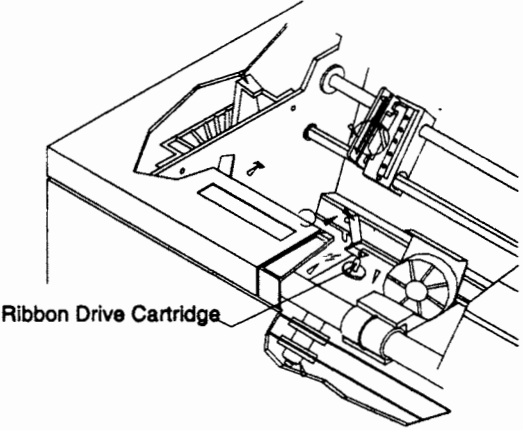
Some of the following troubleshooting solutions request a default reset. While this will cure several problems, it also erases any settings programmed into the printer. As a precaution, first print a features list to list all the programmed values.

5.4.1 GENERAL PRINTER OPERATION

No printer movement, noise, or panel lights.	
<i>Cause</i>	<i>Solution</i>
Printer is not receiving power.	<p>Check to see that the power switch is ON.</p> <p>Plug female end of power cord firmly into power cord receptacle on back of printer. Plug male end of power cord into grounded AC receptacle.</p> <p>Make certain there is power at the wall receptacle.</p> <p>Check printer line fuse. Note that a blown fuse typically indicates a more serious problem. Checking or changing the fuse requires a small flat blade screwdriver. For the location of the fuse, see Figure 1.2 on page 1-4.</p>

Printhead moves erratically, or not at all.

<i>Cause</i>	<i>Solution</i>
Debris is clogging printer.	Look in printer and remove any foreign matter.
Interface cable is not properly attached.	Make certain the interface cable is securely attached to the printer and the host.
Drive cables may be damaged.	<p>Manually move the printhead back and forth. Check that the drive cables are not damaged. If they are damaged, contact the dealer.</p> <p>If the printhead moves and the cables are not damaged, perform a default reset. See Section 5.3. To verify printer operation, perform a self-test.</p> <p>To perform a self-test: Press the Enter Setup key. Press the Display ▲ key or Display ▼ key until the number 99 is displayed. To start printing, press the Set key. To stop printing, press the Clear key.</p>
Left margin sensor may be defective.	Contact the dealer.

Printer does not print, but printhead moves.	
<i>Cause</i>	<i>Solution</i>
Faulty or missing ribbon cartridge.	<p>If missing, install ribbon cartridge.</p> <p>Replace worn or broken ribbon.</p> <p>Remove the ribbon cartridge and try advancing the ribbon manually. If the ribbon does not move, replace it.</p>
Faulty ribbon mechanism.	<p>Make sure the ribbon drive blade is not jammed inside ribbon advance mechanism.</p> <p>Remove the ribbon cartridge, manually move carriage back and forth and watch the drive blade to see that it rotates counterclockwise. If it does not, contact the dealer.</p> 
Improper printhead position.	Adjust printhead adjustment lever.
Cable(s) disconnected.	<p>Check to see that the printhead ribbon cable is attached to the printhead.</p> <p>If the cables are disconnected, contact the dealer.</p>
Improper commands sent from host computer.	Perform a default reset. See Section 5.3.

Printer won't print and printhead won't move.

<i>Cause</i>	<i>Solution</i>
Printer is off line.	<p>Check to see if the On line light is on. If it is not, press the On line key to turn it on.</p> <p>It may also be necessary to perform a self-test. To perform a self-test: Press the Enter Setup key. Press the Display ▲ or Display ▼ until the number 99 is displayed. To start printing, press the Set key. To stop printing, press the Clear key.</p> <p>If the self-test prints, check the connections to the host computer.</p> <p>If the above solutions do not correct the problem(s), contact the dealer.</p>

Printer doesn't print and Paper Out light blinks.	
<i>Cause</i>	<i>Solution</i>
<p>Paper is too thin or back of paper is too dark.</p>	<p>The Paper Out sensor works by reflecting light off the print media. A too-thin media allows light to pass through instead of reflecting it, and a too-dark media absorbs light instead of reflecting it. This means that the printer cannot "see" that the paper is there.</p> <p>To stop the Paper Out light from blinking, use thicker paper, or paper of lighter color, or set Feature 40 (Paper-out disable) to 1.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>CAUTION <i>When Feature 40 is enabled, supply more forms than needed for the print job. This prevents the printhead from printing directly on the platen.</i></p> </div>
<p>Paper is not covering light sensor.</p> <p>Pin feed holes moving across light sensor.</p>	<p>Move paper to the left and reset left and right margins. Reset the margins using Features 5 and 6.</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>NOTE After taking corrective action press Continue button. Do not perform a default reset.</p> </div> <p>If the above solutions do not correct the problem(s), contact the dealer.</p>
<p>Faulty photosensor.</p>	<p>Contact the dealer.</p>

Paper out light is off when there is no paper in the printer.	
<i>Cause</i>	<i>Solution</i>
<p>Feature 40 set to 1.</p>	<p>Reset Feature 40 to 0. Feature 40 could have been set from control panel or by software from the host.</p>
<p>Paper trash or dust on Paper Out sensor.</p>	<p>Remove dust or trash. See Figure 1.1 on page 1-2 for location of the Paper Out sensor.</p>

Printhead snags ribbon.

Cause

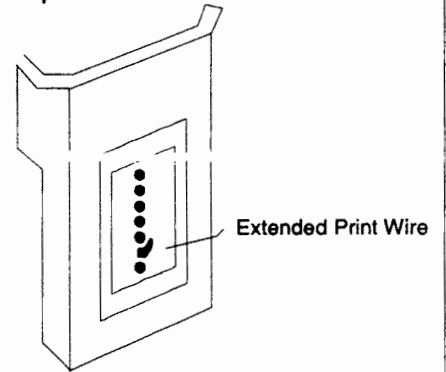
Solution

Printhead is too close to or too far from paper.

Use printhead adjustment lever to move printhead away from or toward paper.

Ribbon path obstructed.

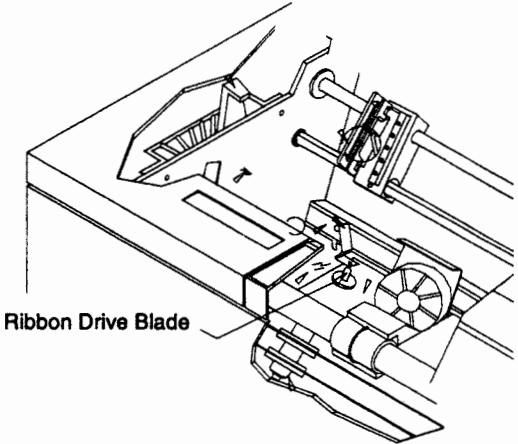
Check printhead for an extended print wire. If found, replace printhead.
To replace printhead, see the instructions that accompany the new printhead.



Ribbon smudge guard is damaged.

Check plastic smudge guard on ribbon cartridge. If damaged, replace the ribbon.

5.4.2 PRINT FORMAT AND QUALITY

Print is too light, or print is too light on every other line.	
<i>Cause</i>	<i>Solution</i>
Improper printhead position.	Adjust the printhead adjustment lever.
Faulty ribbon cartridge or mechanism.	<p>Replace worn ribbon.</p> <p>Remove ribbon cartridge and try advancing ribbon manually.</p> <p>Remove the ribbon cartridge, manually move carriage back and forth and watch the drive blade to see that it rotates counterclockwise. If it does not, contact the dealer.</p> 
Cable or clutch is damaged.	Move the printhead back and forth. If the cables are loose or the cable springs are not attached, contact the dealer.

Printed dots that form characters are inconsistent: light, dark or randomly missing.

<i>Cause</i>	<i>Solution</i>
Improper printhead adjustment.	Move the printhead closer to the paper with the printhead adjustment lever.
Printhead is worn or damaged.	<p>Examine printhead to ensure that:</p> <ul style="list-style-type: none"> •All printwires (9) extend evenly beyond the jewel. •The jewel that holds the wires is not cracked or missing. •A printwire does not extend beyond the others. <div data-bbox="1079 655 1507 1018" data-label="Image"> <p>A perspective view of a printhead. A rectangular jewel is visible, with nine small dots representing printwires extending from it. One wire is labeled 'Extended Print Wire'.</p> </div> <ul style="list-style-type: none"> •A printwire is not recessed inside the jewel. <div data-bbox="1144 1117 1453 1459" data-label="Image"> <p>A side view of the printhead. The jewel is on the left, and nine horizontal lines representing printwires extend to the right. The label 'Jewel' points to the left side.</p> <p>When looking at the printhead from the side, the nine print wires should extend the same distance from the jewel.</p> </div> <p>To replace printhead, see the instructions that accompany the new printhead.</p>

Printer advances to wrong position on form.	
<i>Cause</i>	<i>Solution</i>
Top of form not set correctly.	Refer to Top of Form, Section 2.4.3 on page 2-5.
Features 2, 3, 11 and 39 are not set properly.	Verify the correct setting of Features 2, 3, 11 and 39. For information on how to set these features, see Chapter 2.

Ink is smudging.	
<i>Cause</i>	<i>Solution</i>
Printhead is too close to paper.	Move printhead away from paper by moving the printhead adjustment lever toward the front of the printer one position.
Ribbon smudge guard is damaged.	Check plastic smudge guard on ribbon cartridge. If damaged, replace.

5.4.3 PAPER FEED PROBLEMS

Printer occasionally misses a line feed, causing a printover.	
<i>Cause</i>	<i>Solution</i>
Restricted paper path.	Clear the paper path. Paper should not travel across desk corner, edge of paper box, etc. Ensure that paper has direct path into printer.

Paper won't advance.	
<i>Cause</i>	<i>Solution</i>
Form feed features 2, 3, 11 and 38 are not set properly.	Verify the correct setting of Features 2, 3, 11 and 38. For information on how to set these features, see Chapter 2.

Paper feeds through printer continuously.	
<i>Cause</i>	<i>Solution</i>
Incorrect baud rate for serial connection.	Verify the correct baud rate setting in Feature 1 and from the host.
Large number of form feeds sent to printer.	Press Reset key to clear the memory in the buffer and stop the paper. Check the host computer software.

Paper tearing on right or left side.	
<i>Cause</i>	<i>Solution</i>
Forms tractors are too close or too far apart.	Adjust tractors to fit form being used. See Section 1 for proper tractor setting.
Margin setting causes printhead to move beyond paper edge.	Reset the right margin using Feature 6. or reset the left margin using Feature 5. Move form slightly to the left so edge of printhead does not leave the paper.

Paper tearing at top or bottom.	
<i>Cause</i>	<i>Solution</i>
Paper not loaded properly.	See Section 1 on Forms Loading.
Paper is too thick.	Move printhead away from paper by moving the printhead adjustment lever toward the front of the printer. If using multipart paper, its thickness should not exceed 0.021 inches.
Ribbon smudge guard is damaged.	Check plastic smudge guard on ribbon cartridge. If it is damaged, replace the cartridge.

Paper will not thread properly when front-feeding. (Demand Document printer models do not front feed.)	
<i>Cause</i>	<i>Solution</i>
Paper has downward curl at edge (prevents paper from contacting paper-guide).	Curl the paper edge upward or start with new sheet.
Paper-feed slot is obstructed.	Remove any debris.
Paper path to printer is obstructed.	Paper should not travel across desk corner, edge of box, etc. Paper should be located directly under the printer paperfeed slot. See Chapter 1, <i>Printer Installation and Startup</i> .

Paper will not thread properly when bottom-feeding.	
<i>Cause</i>	<i>Solution</i>
Paper-feed slot is obstructed.	Remove any debris. Ensure that bottom Paper Guide strip is inside printer, flexed upward in direction of paper path. To prevent dislocation of the Paper Guide strip, be careful when pulling paper from bottom of printer. Paper perforations can catch on strip.

5.4.4 PRINTER CONNECTION PROBLEMS

Printer prints garbled data.	
<i>Cause</i>	<i>Solution</i>
Interface may be set incorrectly.	See Section 3 to set serial interface properly. See Section 3.4 to set parallel interface properly. Power printer OFF and ON.

Printer will not communicate when using parallel interface.	
<i>Cause</i>	<i>Solution</i>
Feature settings are incorrect.	Reset Features 59 and/or 66. See Appendix F for default feature settings.

Printer will not communicate when using serial interface.	
<i>Cause</i>	<i>Solution</i>
Feature settings are incorrect.	Reset Feature 43. See Appendix F for default feature settings.

Printer prints "Buffer overflows" on paper during print job.	
<i>Cause</i>	<i>Solution</i>
Incorrect interface settings.	Check interface settings. See Section 3.
Faulty interface cable or incorrect pin configuration of interface cable.	<p>Check cables.</p> <p>May be wrong type of cable. For proper configuration of the interface cable pins, see Section 3.</p> <p>If cable appears damaged, contact the dealer.</p>

APPENDIX A SPECIFICATIONS

PRINT AND FORMAT CHARACTERISTICS

PRINTHEAD:

9-wire ballistic-type matrix head

PRINT MODES:

9x7 matrix in draft mode at 300 CPS
High resolution dot addressable graphics

CHARACTER PITCH/MAXIMUM LINE LENGTH:

5 cpi / 66 columns
6 cpi / 79 columns
6.6 cpi / 87 columns
7.5 cpi / 99 columns
8.5 cpi / 109 columns
8.75 cpi / 115 columns
10 cpi / 132 columns
12 cpi / 158 columns
13.3 cpi / 175 columns
15 cpi / 198 columns
16.7 cpi / 219 columns
17.5 cpi / 231 columns

VERTICAL PITCH:

6 or 8 lines per inch or programmable in 1/48 inch increments

GRAPHICS

INTERNATIONAL CHARACTER SETS:

U.S. ASCII	Spanish
U.K. ASCII	APL
German	IBM Compatible
French	Spanish II
Swedish/Finnish	Custom Character Set I
Norwegian/Danish	Multinational
Greek	Italics

HORIZONTAL TABS:

1 per column

VERTICAL TABS:

1 per line

FORM LENGTH:

Up to 217 lines

MULTIPART FORM THICKNESS:

9 parts up to .021", adjustable

CARRIAGE SLEW RATE:

30"/second maximum

COLUMNS:

Up to 231 @ 17.5 cpi

FORM WIDTH:

3"-15"

PAPER FEED:

Tractor for continuous forms (bottom or front feed)

PAPER SLEW RATE:

5 inches per second

ADDITIONAL FEATURES:

Perforation skipover
Paper out indicator
On-line/Off-line selection
Top of form

COMMUNICATIONS CHARACTERISTICS

INTERFACE:

RS 232 serial
Centronics-compatible parallel

HANDSHAKING PROTOCOLS:

X-On, X-Off
Data Terminal Ready
Acknowledge Handshaking/Acknowledge

COMMUNICATIONS RATE:

110-19,200 baud

BUFFER:

3K character FIFO

APPENDIX A - CONTINUED

GENERAL CHARACTERISTICS

CASE:

Gray high impact structural foam thermoplastic

DISPLAY:

4-digit LED

RIBBON:

Cartridge
1/2"x15 yards continuous loop

MICROPROCESSOR:

Intel 8085-2

SIZE:

7.8"Hx24.5"Wx16"D

WEIGHT:

35 lbs./16 Kilos

ELECTRICAL REQUIREMENTS:

110/220VAC +/- 15%
50/60Hz

ENVIRONMENTAL:

Operating

Temperature:
5 C - 40 C(41 F - 104 F)

Humidity:
15 to 90% (no condensation)

Shock:

0 g

Vibration:

1/2 g maximum with a frequency of 10 to 60 Hz

Altitude:

3048 meters (10,000 feet) above MSL, maximum. Derate maximum temperature linearly from 40 C at 1523 meters to 25 C at 3048 meters.

Non-Operating (In Shipping Container)

Temperature:

-30 C to +70 C (-24 F to +158 F)

Relative Humidity:

5% to 95% (no condensation)

Shock:

30 g maximum (1/2 sinewave with a duration of 11 milliseconds along any three perpendicular axes).

Vibration:

2 g maximum with frequency of 10 to 300 Hz
6 minute linear sweep.

Altitude:

15,240 meters (50,000 ft.) above MSL, maximum.

AGENCY COMPLIANCES:

Safety:

UL1950
CSA C22.2 No. 950-M89
IEC 950

Electromagnetic Interference:

FCC Class A
CISPR22 Class A
VDE Class B

APPENDIX B DATASOUTH CHARACTER LIBRARY *

N	0	Š	1	Š	2	Š	3	Š	4	Š	5	Š	6	Š	7	Š	8	Š	9
F	10	V	11	F	12	K	13	S	14	S	15	L	16	B	17	B	18	B	19
D	20	K	21	S	22	E	23	K	24	E	25	S	26	E	27	E	28	E	29
R	30	U	31		32	!	33	"	34	#	35	\$	36	%	37	&	38	'	39
(	40	)	41	*	42	+	43	,	44	-	45	.	46	/	47	0	48	1	49
2	50	3	51	4	52	5	53	6	54	7	55	8	56	9	57	:	58	;	59
<	60	=	61	>	62	?	63	@	64	A	65	B	66	C	67	D	68	E	69
F	70	G	71	H	72	I	73	J	74	K	75	L	76	M	77	N	78	O	79
P	80	Q	81	R	82	S	83	T	84	U	85	V	86	W	87	X	88	Y	89
Z	90	[	91	\	92	]	93	^	94	_	95	`	96	a	97	b	98	c	99
d	100	e	101	f	102	g	103	h	104	i	105	j	106	k	107	l	108	m	109
n	110	o	111	p	112	q	113	r	114	s	115	t	116	u	117	v	118	w	119
x	120	y	121	z	122	{	123	|	124	}	125	~	126	■	127	□	128	ü	129
é	130	ë	131	ë	132	è	133	è	134	ç	135	ë	136	ë	137	è	138	ï	139
ŕ	140	î	141	ä	142	ä	143	é	144	œ	145	Æ	146	ö	147	ö	148	ò	149
ö	150	ù	151	ÿ	152	ø	153	ü	154	¢	155	£	156	¥	157	₣	158	₣	159

*Not available with Barcode Option

APPENDIX B -CONTINUED *

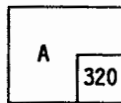
á	160	í	161	ó	162	ú	163	ñ	164	z	165	ë	166	ö	167	ì	168	ˆ	169
˘	170	¼	171	½	172	¾	173	◀	174	▶	175	⋮	176	⋯	177	⋰	178	|	179
†	180	‡	181	§	182	¶	183	§	184	¶	185	||	186	¶	187	¶	188	¶	189
ˆ	190	ˆ	191	ˆ	192	ˆ	193	ˆ	194	ˆ	195	ˆ	196	ˆ	197	ˆ	198	ˆ	199
ˆ	200	ˆ	201	ˆ	202	ˆ	203	ˆ	204	ˆ	205	ˆ	206	ˆ	207	ˆ	208	ˆ	209
ˆ	210	ˆ	211	ˆ	212	ˆ	213	ˆ	214	ˆ	215	ˆ	216	ˆ	217	ˆ	218	■	219
■	220	■	221	■	222	■	223	α	224	β	225	Γ	226	π	227	Σ	228	σ	229
μ	230	τ	231	φ	232	θ	233	Ω	234	δ	235	∞	236	∅	237	€	238	Π	239
≡	240	±	241	λ	242	≤	243	ƒ	244	J	245	÷	246	≈	247	°	248	·	249
-	250	√	251	∧	252	z	253	■	254	×	255	∞	256	⊕	257	!	258	ƒ	259
∅	260	⊕	261	×	262	∅	263	⊥	264	∞	265	∅	266	∞	267	∅	268	∞	269
⊕	270	∞	271	∅	272	∅	273	∅	274	∅	275	∅	276	∅	277	∅	278	∅	279
∞	280	∞	281	∞	282	<	283	>	284	]	285	∨	286	∧	287	≠	288	,	289
+	290	[	291	;	292	x	293	-	294	α	295	⊥	296	n	297	L	298	ε	299
∇	300	Δ	301	∩	302	∪	303	'	304	□	305	|	306	T	307	∅	308	*	309
?	310	P	311	Γ	312	~	313	↓	314	U	315	ω	316	∩	317	↑	318	c	319

*Not available with Barcode Option

APPENDIX B -CONTINUED *

←	320	┌	321	→	322	◇	323	┐	324	└	325	┘	326	†	327	‡	328	“	329
ˆ	330	˜	331	•	332	ı	333	ı	334	#	335	ı	336	˘	337	˙	338	˚	339
˛	340	˜	341	˘	342	˙	343	˚	344	˛	345	˜	346	˘	347	˙	348	˚	349
˛	350	˜	351	˘	352	˙	353	˚	354	˛	355	˜	356	˘	357	˙	358	˚	359
˛	360	˜	361	˘	362	˙	363	˚	364	˛	365	˜	366	˘	367	˙	368	˚	369
˛	370	˜	371	˘	372	˙	373	˚	374	˛	375	˜	376	˘	377	˙	378	˚	379
˛	380	˜	381	˘	382	˙	383	˚	384	˛	385	˜	386	˘	387	˙	388	˚	389
˛	390	˜	391	˘	392	˙	393	˚	394	˛	395	˜	396	˘	397	˙	398	˚	399
˛	400	˜	401	˘	402	˙	403	˚	404	˛	405	˜	406	˘	407	˙	408	˚	409
˛	410	˜	411	˘	412	˙	413	˚	414	˛	415	˜	416	˘	417	˙	418	˚	419
˛	420	˜	421	˘	422	˙	423	˚	424	˛	425	˜	426	˘	427	˙	428	˚	429
m	430	%	431	™	432	®	433	©	434										

Character



Index #

*Not available with Barcode Option

APPENDIX C CHARACTER SETS

US ASCII (IBM PC Compatible) Character Set

HEX	0	1	2	3	4	5	6	7
0	N 0	R 16	32	O 48	@ 64	P 80	` 96	p 112
1	S 1	B 17	! 33	1 49	A 65	Q 81	a 97	q 113
2	X 2	D 18	" 34	2 50	B 66	R 82	b 98	r 114
3	X 3	D 19	# 35	3 51	C 67	S 83	c 99	s 115
4	F 4	D 20	\$ 36	4 52	D 68	T 84	d 100	t 116
5	E 5	N 21	% 37	5 53	E 69	U 85	e 101	u 117
6	A 6	S 22	& 38	6 54	F 70	V 86	f 102	v 118
7	Q 7	E 23	' 39	7 55	G 71	W 87	g 103	w 119
8	B 8	C 24	(40	8 56	H 72	X 88	h 104	x 120
9	H 9	E 25	) 41	9 57	I 73	Y 89	i 105	y 121
A	F 10	S 26	* 42	: 58	J 74	Z 90	j 106	z 122
B	V 11	E 27	+ 43	; 59	K 75	[91	k 107	{ 123
C	F 12	E 28	, 44	< 60	L 76	\ 92	l 108	| 124
D	C 13	E 29	- 45	= 61	M 77	] 93	m 109	} 125
E	S 14	R 30	· 46	> 62	N 78	^ 94	n 110	~ 126
F	F 15	S 31	/ 47	? 63	O 79	_ 95	o 111	ß 127

APPENDIX C - CONTINUED

IBM PC Compatible Secondary Character Set

HEX	8	9	A	B	C	D	E	F
0	€ 128	é 144	ê 160	ë 176	ì 192	í 208	î 224	ï 240
1	ü 129	œ 145	í 161	ï 177	ú 193	û 209	ü 225	ÿ 241
2	ë 130	æ 146	ó 162	ï 178	ı 194	ı 210	ı 226	ı 242
3	ð 131	ö 147	ú 163	ı 179	ı 195	ı 211	ı 227	ı 243
4	ë 132	ö 148	ı 164	ı 180	ı 196	ı 212	ı 228	ı 244
5	ë 133	ö 149	ı 165	ı 181	ı 197	ı 213	ı 229	ı 245
6	ë 134	ö 150	ı 166	ı 182	ı 198	ı 214	ı 230	ı 246
7	ë 135	ö 151	ı 167	ı 183	ı 199	ı 215	ı 231	ı 247
8	ë 136	ö 152	ı 168	ı 184	ı 200	ı 216	ı 232	ı 248
9	ë 137	ö 153	ı 169	ı 185	ı 201	ı 217	ı 233	ı 249
A	ë 138	ö 154	ı 170	ı 186	ı 202	ı 218	ı 234	ı 250
B	ı 139	ı 155	ı 171	ı 187	ı 203	ı 219	ı 235	ı 251
C	ı 140	ı 156	ı 172	ı 188	ı 204	ı 220	ı 236	ı 252
D	ı 141	ı 157	ı 173	ı 189	ı 205	ı 221	ı 237	ı 253
E	ı 142	ı 158	ı 174	ı 190	ı 206	ı 222	ı 238	ı 254
F	ı 143	ı 159	ı 175	ı 191	ı 207	ı 223	ı 239	ı 255

APPENDIX C - CONTINUED

IBM Multilingual Secondary Character Set *

HEX	8	9	A	B	C	D	E	F
0	ç 128	é 144	á 160	⋮ 176	Ł 192	š 208	ó 224	— 240
1	ü 129	æ 145	í 161	⋮ 177	Ł 193	Đ 209	ß 225	± 241
2	é 130	æ 146	ó 162	⋮ 178	Ŧ 194	é 210	ö 226	≡ 242
3	ä 131	ö 147	ú 163	| 179	† 195	é 211	ö 227	¼ 243
4	ä 132	ö 148	ñ 164	† 180	— 196	é 212	ö 228	¶ 244
5	à 133	ò 149	ñ 165	À 181	† 197	ı 213	ö 229	§ 245
6	à 134	ü 150	ä 166	ä 182	ä 198	ı 214	ı 230	÷ 246
7	ç 135	ü 151	ó 167	À 183	ä 199	ı 215	ı 231	˘ 247
8	ö 136	ÿ 152	ç 168	ı 184	ı 200	ı 216	ı 232	° 248
9	è 137	ö 153	ı 169	ı 185	ı 201	ı 217	ı 233	… 249
A	è 138	ü 154	ı 170	ı 186	ı 202	ı 218	ı 234	- 250
B	ı 139	ø 155	¼ 171	ı 187	ı 203	ı 219	ı 235	ı 251
C	ı 140	é 156	¼ 172	ı 188	ı 204	ı 220	ı 236	ı 252
D	ı 141	ø 157	ı 173	ı 189	ı 205	ı 221	ı 237	ı 253
E	ä 142	× 158	« 174	ı 190	ı 206	ı 222	ı 238	ı 254
F	ä 143	f 159	» 175	ı 191	ı 207	ı 223	ı 239	ı 255

*Not available with Barcode Option

APPENDIX C - CONTINUED

APL Character Set *

HEX	0	1	2	3	4	5	6	7
0	N 0	R 16	32	O 48	- 64	* 80	◇ 96	P 112
1	⊞ 1	D ₁ 17	~ 33	1 49	α 65	? 81	A 97	Q 113
2	⊞ 2	D ₂ 18	) 34	2 50	⊥ 66	ƒ 82	B 98	R 114
3	⊞ 3	D ₃ 19	< 35	3 51	n 67	Γ 83	C 99	S 115
4	⊞ 4	D ₄ 20	≤ 36	4 52	L 68	~ 84	D 100	T 116
5	⊞ 5	N _R 21	= 37	5 53	ε 69	↓ 85	E 101	U 117
6	⊞ 6	⊞ 22	> 38	6 54	- 70	U 86	F 102	V 118
7	⊞ 7	⊞ 23	] 39	7 55	▽ 71	ω 87	G 103	W 119
8	⊞ 8	⊞ 24	∇ 40	8 56	△ 72	⊃ 88	H 104	X 120
9	⊞ 9	⊞ 25	^ 41	9 57	∖ 73	↑ 89	I 105	Y 121
A	⊞ 10	⊞ 26	≠ 42	(58	° 74	⊂ 90	J 106	Z 122
B	⊞ 11	⊞ 27	÷ 43	[59	' 75	← 91	K 107	⊆ 123
C	⊞ 12	⊞ 28	∗ 44	∫ 60	□ 76	⊢ 92	L 108	→ 124
D	⊞ 13	⊞ 29	+ 45	x 61	| 77	→ 93	M 109	⊃ 125
E	⊞ 14	⊞ 30	• 46	∫ 62	⊤ 78	≥ 94	N 110	\$ 126
F	⊞ 15	⊞ 31	/ 47	∖ 63	○ 79	- 95	O 111	⊞ 127

*Not available with Barcode Option

APPENDIX C - CONTINUED

Custom Character Set *

HEX	0	1	2	3	4	5	6	7
0	N 0	L 16			J 64	X 80	I 96	E 112
1	S 1	D ₁ 17	V 33	O 49	V 65	I 81	Z 97	Æ 113
2	S 2	D ₂ 18	' 34	" 50	' 66	Z 82	3 98	# 114
3	E 3	D ₃ 19	† 35	^ 51	.. 67	3 83	4 99	ñ 115
4	F 4	D ₄ 20	£ 36	˘ 52	- 68	4 84	5 100	§ 116
5	E 5	N 21	ˆ 37	˙ 53	˙ 69	5 85	6 101	κ 117
6	A 6	S 22	' 38	˘ 54	' 70	6 86	7 102	3 118
7	A 7	E 23	" 39	.. 55	˘ 71	7 87	8 103	8 119
8	B 8	C 24	* 40	- 56	' 72	8 88	9 104	€ 120
9	H 9	E 25	i 41	˘ 57	˘ 73	9 89	0 105	8 121
A	F 10	S 26	b 42	- 58	B 74	0 90	- 106	f 122
B	V 11	E 27	# 43	- 59	X 75	- 91	+ 107	3 123
C	F 12	E 28	ı 44	˘ 60	- 76	+ 92	€ 108	€ 124
D	C 13	S 29	˘ 45	* 61	- 77	' 93	0 109	Æ 125
E	S 14	R 30	" 46	- 62	' 78	94	f 110	# 126
F	S 15	U 31	- 47	˘ 63	" 79	95	3 111	0 127

*Not available with Barcode Option

APPENDIX C - CONTINUED

Epson Secondary Character Set *

HEX	8	9	A	B	C	D	E	F
0	à 128	á 144	â 160	ã 176	ä 192	å 208	æ 224	ç 240
1	è 129	é 145	ê 161	ë 177	ì 193	í 209	î 225	ï 241
2	ù 130	ú 146	û 162	ü 178	ý 194	ÿ 210	z 226	ÿ 242
3	ò 131	ó 147	ô 163	õ 179	ö 195	÷ 211	ø 227	ù 243
4	ì 132	í 148	ê 164	ë 180	ì 196	í 212	î 228	ï 244
5	ó 133	ô 149	õ 165	ö 181	÷ 197	ø 213	ù 229	ú 245
6	£ 134	¢ 150	& 166	€ 182	F 198	V 214	f 230	v 246
7	/ 135	À 151	' 167	7 183	G 199	W 215	g 231	w 247
8	¿ 136	Ö 152	¿ 168	ß 184	H 200	X 216	h 232	x 248
9	ÿ 137	Ü 153	ÿ 169	9 185	I 201	Y 217	i 233	y 249
A	ÿ 138	ä 154	* 170	z 186	J 202	Z 218	j 234	z 250
B	ø 139	ö 155	z 171	z 187	K 203	£ 219	k 235	£ 251
C	£ 140	ü 156	z 172	< 188	L 204	\ 220	l 236	/ 252
D	À 141	ä 157	- 173	= 189	M 205	ÿ 221	m 237	ÿ 253
E	à 142	é 158	~ 174	> 190	N 206	^ 222	n 238	~ 254
F	ç 143	ÿ 159	/ 175	? 191	O 207	— 223	o 239	ø 255

*Not available with Barcode Option

APPENDIX C - CONTINUED

Epson Emulation International Character Set

Language Selection	ASCII Decimal value											
	35	36	64	91	92	93	94	96	123	124	125	126
USA	#	\$	@	[	\	\]	^	`	{	|	}	~
FRANCE	#	\$	à	°	ç	§	^	`	é	ù	ë	¨
GERMANY	#	\$	§	À	Ö	Ü	^	`	ä	ö	ü	ß
ENGLAND	£	\$	@	[	\	\]	^	`	{	|	}	~
DENMARK	#	\$	@	Æ	Ø	Å	^	`	æ	ø	å	~
SWEDEN	#	Å	É	À	Ö	Å	Ü	é	ä	ö	ä	Ü
ITALY	#	\$	@	°	\	é	^	ù	è	ò	é	ì
SPAIN	₧	\$	@	í	ñ	¿	^	`	¨	ñ	}	~
JAPAN	#	\$	@	[	¥	]	^	`	{	|	}	~

DEC LA-120 Emulation International Character Set

Language Selection	ASCII Decimal value										
	35	64	91	92	93	94	96	123	124	125	126
USA	#	@	[	\	\]	^	`	{	|	}	~
UK	£	@	[	\	\]	^	`	{	|	}	~
FINLAND	#	@	Ä	Ö	Å	Ü	é	ä	ö	ä	Ü
SWEDEN	#	É	À	Ö	Å	Ü	é	ä	ö	ä	Ü
NORWAY/DENMARK	#	Ä	Æ	Ø	Å	Ü	ä	æ	ø	ä	Ü
GERMANY	#	§	À	Ö	Ü	^	`	ä	ö	ü	ß
FRANCE	₧	à	°	ç	§	^	`	é	ù	ë	¨

APPENDIX D DISPLAY MODE CHARACTERS

Decimal Value	Character	Decimal Value	Character	Decimal Value	Character
0	N	50	2	100	o
1	S	51	3	101	e
2	S	52	4	102	f
3	X	53	5	103	g
4	F	54	6	104	h
5	E	55	7	105	i
6	R	56	8	106	j
7	A	57	9	107	k
8	E	58	0	108	l
9	H	59	:	109	m
10	T	60	<	110	n
11	T	61	=	111	o
12	F	62	>	112	p
13	C	63	?	113	q
14	S	64	@	114	r
15	S	65	A	115	s
16	B	66	B	116	t
17	D	67	C	117	u
18	D	68	D	118	v
19	D	69	E	119	w
20	D	70	F	120	x
21	X	71	G	121	y
22	S	72	H	122	z
23	E	73	I	123	{
24	C	74	J	124	|
25	E	75	K	125	}
26	S	76	L	126	~
27	E	77	M	127	■
28	S	78	N	128	□
29	S	79	O	129	▤
30	E	80	P	130	◊
31	U	81	Q	131	⊠
32	U	82	R	132	⊡
33	!	83	S	133	⊢
34	"	84	T	134	⊣
35	#	85	U	135	⊤
36	\$	86	V	136	⊥
37	%	87	W	137	⊦
38	&	88	X	138	⊧
39	'	89	Y	139	⊨
40	(	90	Z	140	⊩
41	)	91	[	141	⊪
42	*	92	\	142	⊫
43	+	93	]	143	⊬
44	,	94	^	144	⊭
45	-	95	_	145	⊮
46	.	96	`	146	⊯
47	/	97	a	147	⊰
48	0	98	b	148	⊱
49	1	99	c	149	⊲

APPENDIX D - CONTINUED

Decimal Value	Character	Decimal Value	Character	Decimal Value	Character
150	0	200	ℓ	250	-
151	ú	201	ℓ	251	√
152	ÿ	202	△	252	∩
153	ø	203	∩	253	z
154	ü	204	ℓ	254	#
155	¢	205	≡	255	⊠
156	£	206	∫		
157	¥	207	±		
158	℔	208	μ		
159	¢	209	∓		
160	¢	210	∓		
161	í	211	∓		
162	ó	212	ℓ		
163	ú	213	ℓ		
164	ÿ	214	ℓ		
165	ÿ	215	∫		
166	∞	216	∫		
167	∞	217	∫		
168	∞	218	∫		
169	∫	219	∫		
170	∫	220	∫		
171	∫	221	∫		
172	∫	222	∫		
173	∫	223	∫		
174	∫	224	α		
175	∫	225	β		
176	∫	226	Γ		
177	∫	227	π		
178	∫	228	Σ		
179	∫	229	σ		
180	∫	230	ρ		
181	∫	231	τ		
182	∫	232	φ		
183	∫	233	θ		
184	∫	234	Ω		
185	∫	235	δ		
186	∫	236	∞		
187	∫	237	∞		
188	∫	238	€		
189	∫	239	∏		
190	∫	240	≡		
191	∫	241	±		
192	∫	242	≥		
193	∫	243	≤		
194	∫	244	∫		
195	∫	245	∫		
196	∫	246	∫		
197	∫	247	∫		
198	∫	248	°		
199	∫	249	•		

APPENDIX E CONTROL COMMANDS

CTRL G	Bell
CTRL H	Back Space
CTRL I	Horizontal Tab
CTRL J	Line Feed
CTRL K	Vertical Tab
CTRL L	Form Feed
CTRL M	Carriage Return
CTRL N	Shift-out
CTRL O	Shift-in
CTRL Q	X-on
CTRL S	X-off

APPENDIX F VALUE & DISCRETE FEATURES

VALUE FEATURES

FEATURE NUMBER	FEATURE VALUE	DEFAULT VALUE	USER VALUE
01	Baud Rate	9600	_____
02	Form Length	66	_____
03	Top Margin	1	_____
04	Bottom Margin	66	_____
05	Left Margin	1	_____
06	Right Margin	132	_____
07	Horizontal Tabs	(The first 16 tabs are set to column 1) 9,17, 25, 33, 41, 49, 57, 65, 73, 81, 89, 97, 105, 113, 121, 129	_____
08	Vertical Tabs	1 01	_____
09	Print Size	10 (10 CPI)	_____
10	Primary Character Set	1 (U.S. ASCII)	_____
11	Vertical Pitch Selection	8	_____
13	Emulation	1 (DS-180)	_____
15	Secondary Character Set	10 (IBM P.C. Secondary)	_____
23	FIFO High Water Mark	11	_____
25	FIFO Low Water Mark	9	_____

APPENDIX F - CONTINUED

DISCRETE FEATURES

FEATURE NUMBER	FEATURE VALUE	DEFAULT VALUE (1 = Enabled; 0 = Disabled)	USER VALUE
28	Print Inhibit	0	_____
30	X-on, X-off Synchronization Protocol	1	_____
31	DTR Synchronization Protocol	1	_____
32	Parity (Eighth Bit Control)	0	_____
33	Even/Odd Parity Selection	0	_____
34	Auto Wrap	1	_____
36	Auto Line Feed	0	_____
37	Auto Carriage Return	0	_____
38	Form Feed Defeat	0	_____
39	6/8 Lines per Inch	0	_____
40	Paper-Out Detection Override	0	_____
41	Shift-Out selects Double Wide Print	0	_____
42	On Line/Off Line Power Up	0	_____
43	Serial Interface Disable	0	_____
44	Automatic Print Disable	0	_____
45	Exit Doublewide Print On Line Terminator	1	_____
46	Escape Sequence Disable	0	_____
47	Display Mode	0	_____
48	Secondary Character Set Enable	0	_____
49	Anadex Graphics Enable	1	_____
51	Unidirectional Text printing	0	_____
59	Handshake on Busy	0	_____
60	Alternate Graphics Control	0	_____

APPENDIX F - CONTINUED

DISCRETE FEATURES (CONTINUED)

FEATURE NUMBER	FEATURE VALUE	DEFAULT VALUE (1 = Enabled; 0 = Disabled)	USER VALUE
61	Eighth Bit Enable	0	_____
63	ETX/Acknowledge Handshaking	0	_____
66	Parallel Interface Disable	1	_____
70	Barcode Enable	0	_____
71	Acknowledge After Busy	0	_____
80	Serial Number/Bits [1-8; 0-7]	1	_____
81	Transmit 8th Bit On Serial	0	_____
84	Transmit Multiple XOFFS	0	_____
85	Heavy Forms Control	0	_____
86	Modem Control	0	_____
94	Form Feed Control	0	_____
96	Double Strike	0	_____
98	Feature Dump	0	_____
99	Self-Test	0	_____

Index

A

Alternate Graphics Control	F-2
Auto New Line	F-2
Automatic Carriage Return	2-20
Automatic Line Feed	2-20, 4-19, 4-26
Automatic Print Disable	2-22, F-2

B

Baud Rate	2-5, 5-13, F-1
Bottom	2-6 - 2-7, 4-4, 4-10 - 4-11
Bottom Margin	F-1
Buffer Control	2-16, 2-23

C

Character Set	2-10, 2-13, 2-21 - 2-22, 4-2 - 4-3, 4-5 - 4-8, 4-12 - 4-13, A-1, F-1 - F-2
Clear Key	2-8, 2-17 - 2-18, 2-20, 2-27
Communications Interface	1-20, 4-1
Continue Key	2-21
Control Commands	4-1
Current Loop Interface	3-3

D

Default Reset	1-6, 5-5
Digital Display	2-2 - 2-3, 2-12, 2-17
Digital Readout	1-16
Discrete Features	2-3 - 2-4, 2-17, 2-27, 4-3, F-2 - F-3
Display Mode	2-22, 4-1, 4-3, F-2
DTR Synchronization Protocol	2-18, F-2

E

Eighth Bit Enable	2-23, 4-13, F-3
Enter Setup Key	2-3
Error Code	2-2
Error Indicator	2-2
Escape Sequences	2-12, 2-22, 2-27, 4-1 - 4-13, 4-25, 4-32, F-2
Even/Odd Parity	2-20
Exit Setup Key	2-3

F

Feature Listing	2-5, 2-17, 2-26, F-3
Feature Value Key	2-3
Forms	1-1, 1-9, 1-11 - 1-12, 1-16 - 1-17, 2-2 - 2-3, 2-6, 2-12, 2-20, 2-22, 2-26, 4-1, 5-3, 5-14, A-1
Bottom-Loading on a Standard Printer	1-11
Front-Loading On A Standard Printer	1-10
Length	2-6, 4-4, 4-10, A-1, F-1
Loading On A Demand Document Printer	1-15
Loading On A Standard Printer	1-9
Thickness	1-9

Form Feed Defeat	2-20, F-2
Form Feed Key	2-2

G

Graphics	2-22 - 2-23, 4-9, 4-15 - 4-16, 4-20 - 4-22, 4-26 - 4-27, A-1
----------------	--

H

Handshake On Busy	2-23
Handshaking Protocol	2-23, A-1
Horizontal	2-8, 4-2, 4-4 - 4-5, 4-8, 4-11
Horizontal Tab	2-8, 4-1, 4-11, A-1, F-1

I

Interface Cable	iii, 3-6, 5-5
Interfacing	1-20, 2-23, 3-1, 4-21

L

Left And Right Margins	2-4, 2-7, 4-10, 5-8
Line Feed Key	2-2
Lines Per Inch	2-12, 2-20, A-1
Loading Forms	1-9
On A Demand Document Printer	1-15
On A Standard Printer	1-9

M

Maintenance	5-1
Margins	1-6, 1-10 - 1-11, 1-17, 2-2, 2-4 - 2-8, 2-20 - 2-21, 2-26, 4-4, 4-9 - 4-11, 4-18, 5-3, 5-5, 5-8, 5-14

N

New Page Key	1-11 - 1-12
--------------------	-------------

O

Operation	iii, 2-1 - 2-2, 2-4 - 2-5, 2-17, 2-21, 2-27, 4-15, 4-20
Operator Panel	1-6, 1-19, 2-1 - 2-5, 2-10, 2-17

P

Paper Out Detection	2-21
Parallel Interface	1-20, 2-24 - 2-25, 3-1, 3-4, 3-6 - 3-7, 5-2, 5-16, F-3
Parity	2-19 - 2-20, F-2
Power Indicator	2-2
Power Up	2-17, F-2
Print Inhibit	2-18, F-2
Print Size	2-9, F-1
Printer	
Control	2-22
Install And Power On	1-5
Install And Startup	1-1
Unpack And Set Up	1-4
Verify Operation	1-19

Printer Interface Types	1-20
Printer Requirements	1-1
Printhead Adjustment	1-7, 1-10 - 1-13, 1-16 - 1-18, 5-9, 5-11
Programming	2-5, 2-17, 2-27, 4-1, 4-15, 4-20

R

Reset Key	2-2
Ribbon Cartridge Installation	1-8, 1-14
Install The Ribbon Cartridge On A Demand Document Printer	1-13
Install The Ribbon Cartridge On A Standard Printer	1-7
Right And Left Margins	2-4, 2-7, 4-10, 5-8

S

Serial Interface	2-21, 2-23, 2-25, 3-1 - 3-3, 5-2, 5-16, F-2
Serial Interface Disable	2-21, F-2
Set Key	2-3, 2-21, 5-13
Setup Indicator	2-2
Space Key	1-16 - 1-17
Specification	4-2, A-1
Stop Key	1-19

T

Tab	-i, 2-7 - 2-8, 2-10, 2-13, 2-20, 2-22, 4-2, 4-4 - 4-5, 4-8, 4-11, 4-18 - 4-19, 4-26, A-1, F-1
Troubleshooting	4-1, 5-1 - 5-2

U

Unidirectional Text Printing	2-23
------------------------------------	------

V

Value Feature	2-5, 2-12
Vertical Tab	2-6, 2-8, 4-1, 4-11, A-1, F-1

AMT Datasouth Corp.

Corporate Headquarters

*4765 Calle Quetzal
Camarillo, CA 93012
(805) 388-5799 PH
(805) 484-5282 FX*

Charlotte Operation

*4216 Stuart Andrew Blvd.
Charlotte, NC 28217
(704) 523-8500 PH
(704) 525 6104 FX*

AMT Datasouth International

*Unit B, Pinnacle 15
Gowerton Rd, Brackmills
Northampton, NN4 7BW
England
+44 1604 763394 PH
+44 1604 760661 FX*

www.amtdatasouth.com